ELECTRICAL TIMES

THURSDAY
7 FEB. 1952
NINEPENCE

B.I. Callender's

PRESSED COPPER SERVICE BOXES

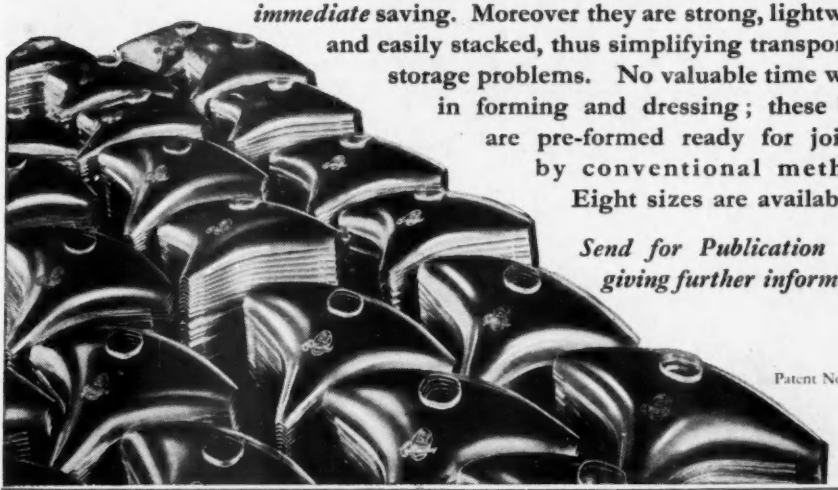
LIGHTWEIGHT

ECONOMICAL

READY FOR USE

Consider the benefits obtained by using BICC Pressed Copper Service Boxes. With lead at its present high price, the purchase of COPPER boxes shows an *immediate* saving. Moreover they are strong, lightweight and easily stacked, thus simplifying transport and storage problems. No valuable time wasted in forming and dressing; these boxes are pre-formed ready for jointing by conventional methods. Eight sizes are available.

Send for Publication 211W. giving further information.



Patent No. 614477

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

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Engineers the world over readily appreciate the advantages of aluminium sheathing even when described in Basic English.

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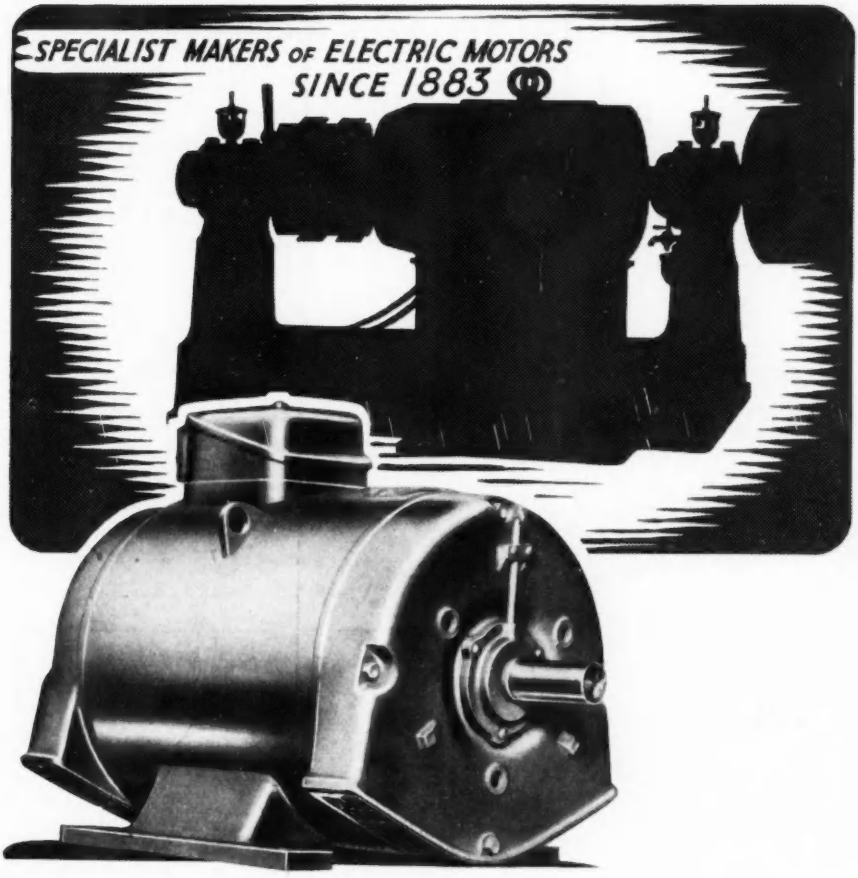
The mark that means that "little more" in quality



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LAURENCE, SCOTT & ELECTROMOTORS LIMITED

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"Cressall" Sliding Resistances are manufactured in an immense variety of types and sizes to meet every known requirement. Every "Cressall" resistance is of sound design and incorporates the best possible workmanship — yet prices are competitive.

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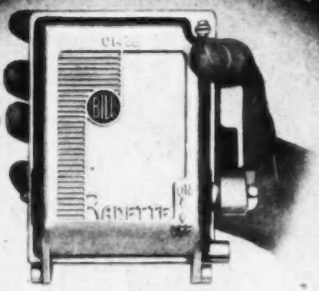
You cannot buy better gear



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EMINENTLY SUITABLE FOR MACHINE TOOLS
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BELLING STREAMLINE 2 boiling plates and grill-boiler. Extra large oven clear of all electrical parts with rounded corners for easy cleaning. Armourplate inner glass door. Interior floodlighting. Automatic heat control throughout. Big warming cupboard. Large splash plate and hob cover. £49.10.0. Available on wheels for easy cleaning.

In the past you probably haven't had all the Belling cookers you asked for. But the new plant which we've installed is beginning to make a difference to production and you can now order with confidence of getting quicker delivery.

BELLING 47 SERIES 2 boiling plates and grill-boiler. Large warming cupboard. Large oven clear of all electrical parts, with rounded corners for easy cleaning. Automatic oven control. Black and white vitreous enamel. £29.10.0. Optional extras: utensil drawer, simmerstats, cream finish, and, of course, the inner glass oven door for visible cooking. Ask for details of other cookers in the 46/47 range from £25.0.0.

BABY BELLING Biggest of the "Babies" yet one of the lowest in price. It's the best-known of all small cookers, and the easiest to sell. It has the largest oven—almost as big as many full-sized cookers. Standard E.D.A. grill-boiler. Really large warming compartment. In black and white vitreous enamel, £13.15.0. With stand £15.19.0.

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Low temperature baking
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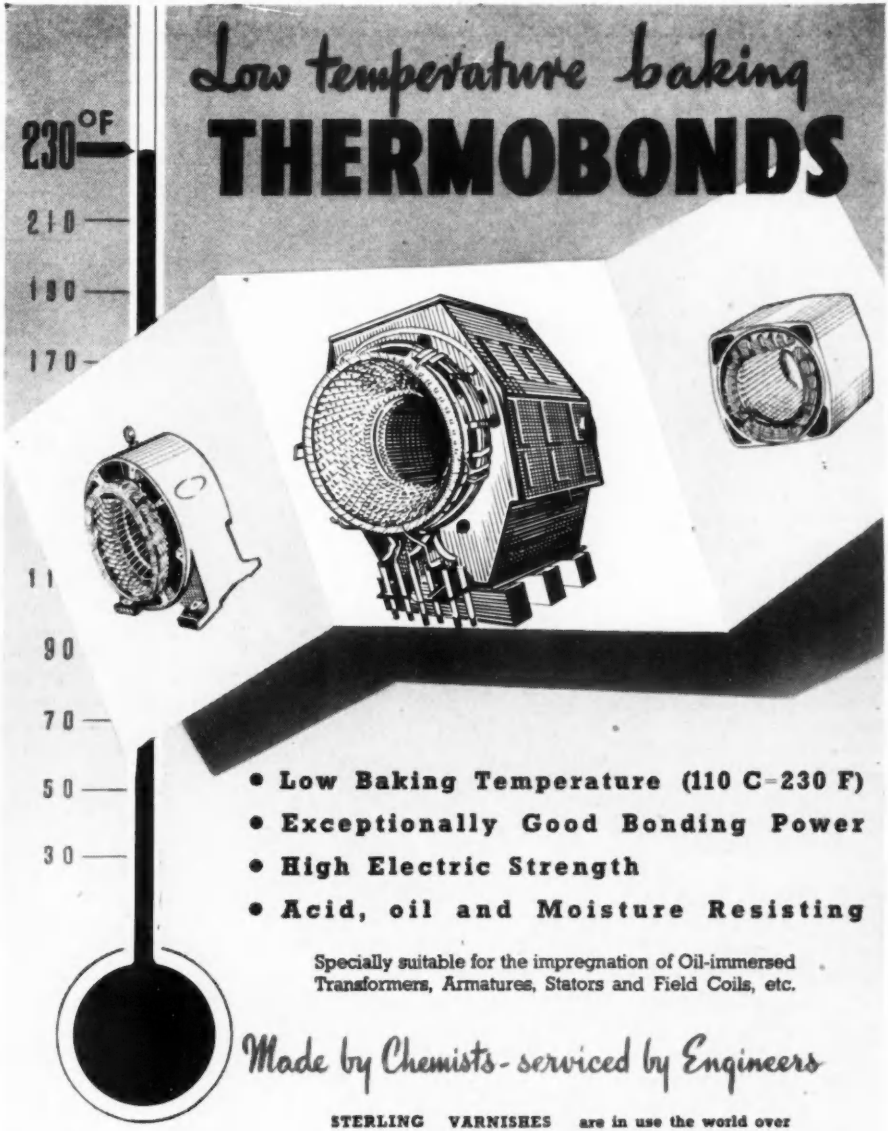

- **Low Baking Temperature (110 C–230 F)**
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Specially suitable for the impregnation of Oil-immersed Transformers, Armatures, Stators and Field Coils, etc.

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TELEPHONE : TRA 0282/3/4. GRAMS : "DIELECTRIC" MANCHESTER

Available with pointer or cyclometer type dial

TYPE TM2

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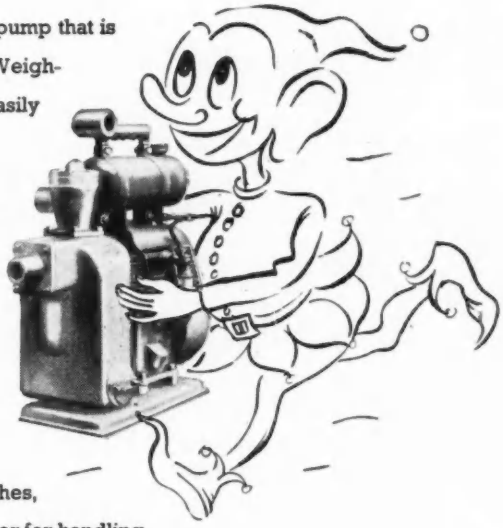
TELEPHONE: BANGOR 860 TELEGRAMS: BRITMETER, BANGOR

ONE OF THE DENIS FERRANTI GROUP

Water in the wrong place ?
Let the GOBLIN move it



Here's a pump that is on the spot in no time. Weighing only 56 lbs. it can be easily carried in one hand. And what a compact and powerful unit it is with a capacity of up to 4,000 gallons per hour, a suction lift of 25 ft. and a total head of 70 ft. It has an air-cooled 4-stroke petrol engine rated at 1.2 B.H.P. and it runs for ten hours on a gallon of fuel.

For draining pipe trenches, foundations, sumps and the like, or for handling seepage (with up to 25% solids) the GOBLIN is probably what you need. But there *are* five bigger brothers to choose from if the job you have in mind is just too much for this sturdy little fellow!

Write and tell us your requirements.

WARSOP self-priming centrifugal pumps. 1½", 2", 3" and 4" petrol driven; 3" and 4" diesel driven. By the makers of the famous WARSOP Breaker and Rock Drill. Sales and Service Stations at London, Taunton, Bedford, Burton-on-Trent, Stockport, Newport (Mon), Leeds, Glasgow, Belfast, Dublin.

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PORTABLE PUMPS

DEPT. E.T.1

WARSOP POWER TOOLS LTD.

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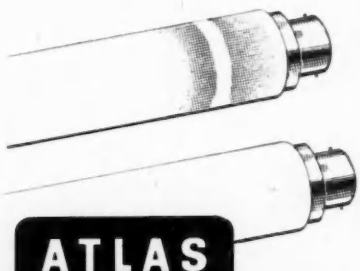
Telephone: REGent 4632 (2 lines)
Cables: Warpetdril, Piccy, London.

Watch out for those black rings

The weary watchman nearing the end of his round, and fluorescent lamps, which have given all of their brightness, show these 'black rings' of fatigue.

But ATLAS "Double-life" lamps—like some fortunate people—are fashioned on longer-lasting lines. They're still light-hearted when the others lack lustre.



Many fluorescent lamps show "black rings"—the sign of approaching failure—after as little as 1,000 hours!

ATLAS "Double-life" lamps, *guaranteed for 5,000 hours*, remain bright and healthy to the end.

ATLAS
"double-life"
FLUORESCENT LAMPS

TWICE THE LIFE
—NO EXTRA COST!

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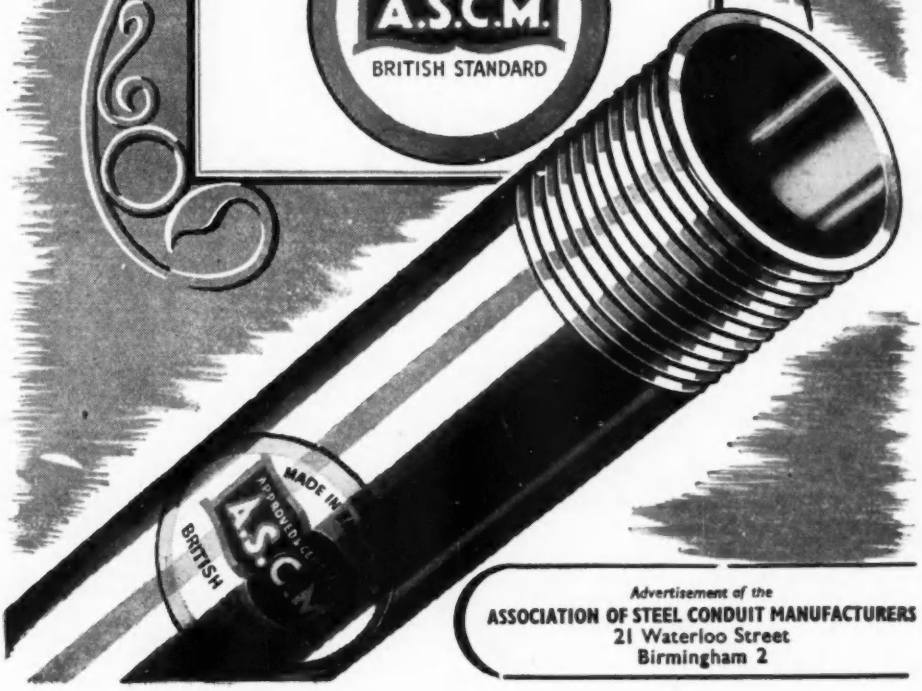

Advertisement of the
ASSOCIATION OF STEEL CONDUIT MANUFACTURERS
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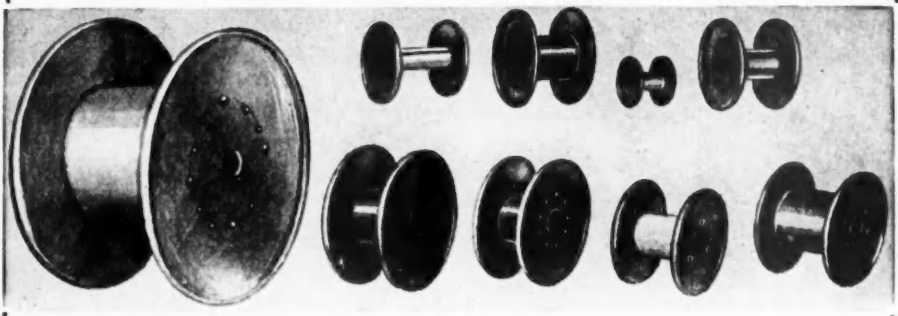
REELS LTD.

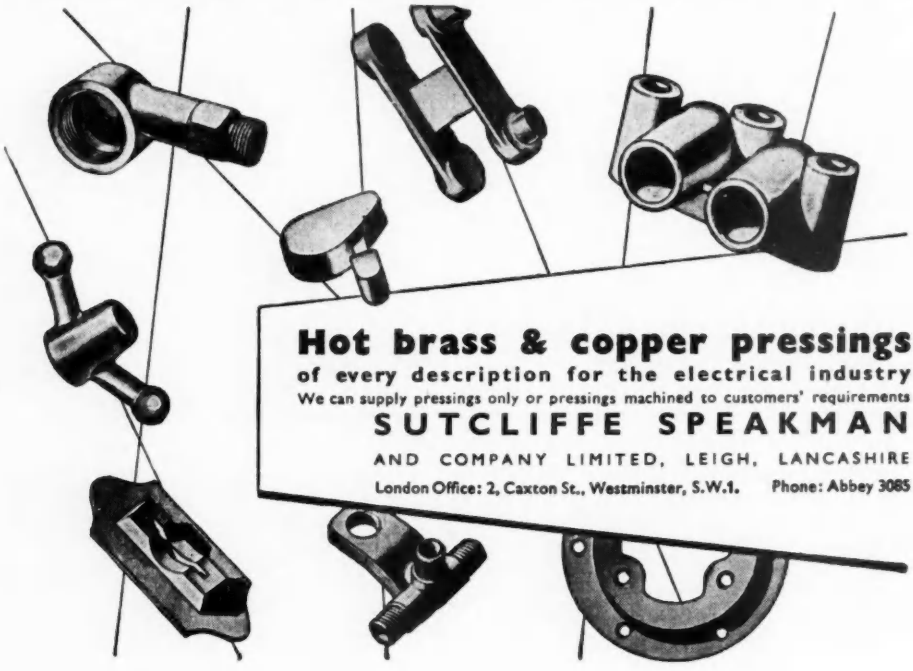
BYRON STREET : PRESTON : 'PHONE : 3922



Makers of all kinds of wood and steel reels for the electric wire and cable trades.

Our Speciality :—Steel flanges with very strong beaded edges in a wide range of diameters.

Try **REELS LTD.** *for* **R**igid **E**fficient **E**ver-lasting **L**ight **S**trong



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of every description for the electrical industry

We can supply pressings only or pressings machined to customers' requirements

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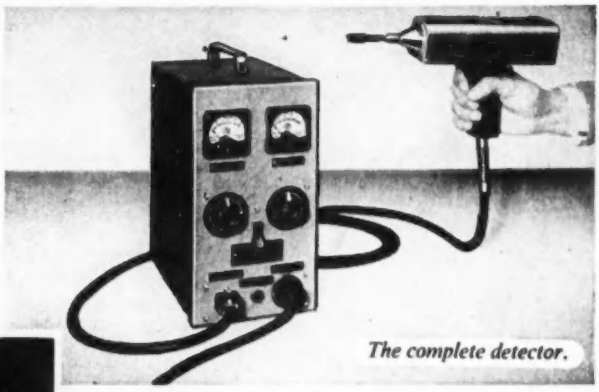
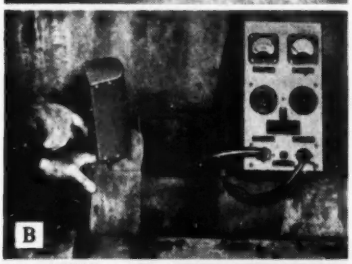
Electronic LEAK DETECTOR

Convenient
Accurate
Sensitive



The complete detector.

A



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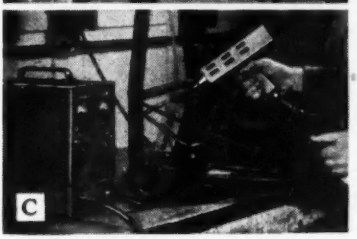

C

Leaks in containers or pipes imperceptible by other means can be easily and accurately located by the BTH Type H Electronic Leak Detector. This instrument, developed in the BTH Research Laboratories to detect the vapours of halogen compounds in air, is sensitive enough to react to Arcton ($C CL_2 F_2$) escaping from a container at the rate of 1/50 oz. per year. The detector is easily portable—eminently suited to use in the laboratory or on the assembly line, or for service testing in the field. Applications include testing of refrigeration and air-conditioning plant, which already contains a halogen-bearing compound, and leak-testing of tanks, pipes, joints, welds, pneumatic systems, etc. by introducing a suitable " tracer " gas into the system under test. The detector emits, by means of a small built-in sounder, a series of clicks ; a change of frequency denotes the presence of a leak. For work in noisy surroundings headphones are available.

Illustrations show use of the detector in examining for leaks (A) *Gas-filled cables* (B) *Pipe seams* (C) *Refrigerator unit.*

THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

Member of the AEI group of companies

A493

Originality

In 1930 we introduced this first self-contained front-operated cooker control unit. Cookers had formerly been controlled either by a clumsy ironclad main switch, or by a makeshift assembly of units on a wood panel.

MK policy over the years has maintained the lead with improved designs and reduced costs, and in consequence the popular, compact unit of today is offered at a **lower** price than its 1930 predecessor.

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Phone: Tottenham 5151 *Grams*: Multiconta, Southtot, London

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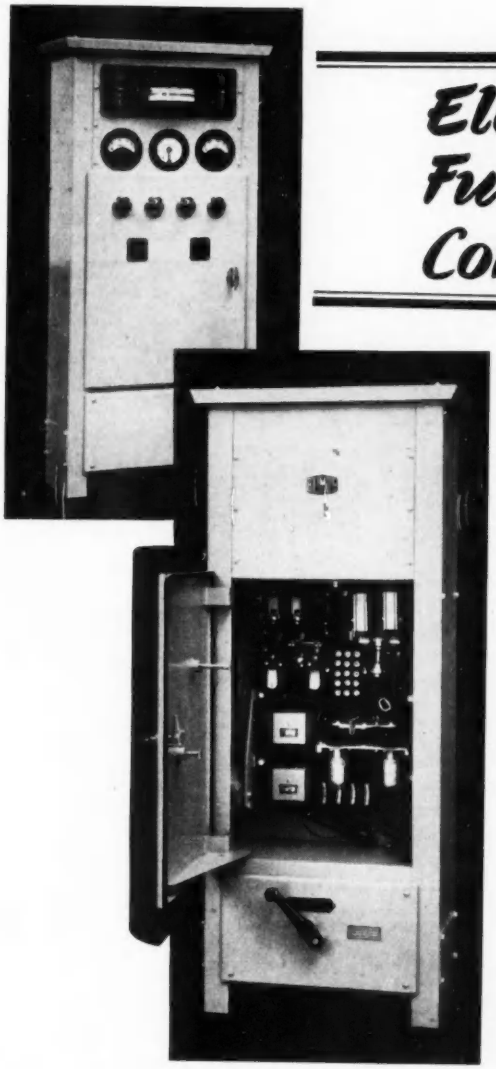

Electric Furnace Control

BELMOS

ELECTRIC FURNACE CONTACTOR PILLAR WITH SEPARATE REMOTE CONTROL PILLAR

Left

CONTACTOR PILLAR
comprising 150 amp. D.P. contactor with overloads for furnace load and 30 amp. D.P. contactor for fan.
Isolating switch in separate compartment.

Top Left

CONTROL PILLAR housing:—
Electronic Temperature Control Instrument.
Ammeter, Wattmeter, Voltmeter.
Indicating Lamps.
HAND/OFF/AUTO Switches.

THE **BELMOS** COMPANY LIMITED

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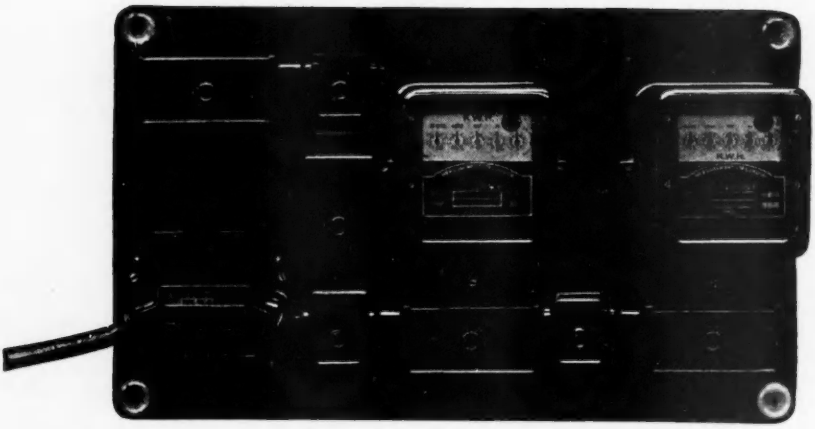

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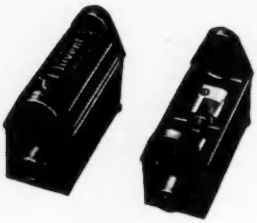
EXPRESSED IN TERMS OF DISTRIBUTION



This typical arrangement, incorporating Aeroflex House Service Cut-Outs and Fluvent Meter Trunking is a guarantee of long trouble-free life. The Aeroflex Service Cut-Out can now be supplied with the Aeroflex AFSK 60 amp. fuse bridge equipped with Aeroflex Ceram CSK 60 amp. cartridge fuse links. This complies not only with BS 88, cat. 440 AC4 but, in dimensions, with BS 1361. These cartridges are consequently interchangeable with other makes to this Specification.

INCORPORATING

PARMITER, HOPE & SUGDEN LIMITED

FLUVENT Electrical Works, Longsight, MANCHESTER 12

London: 34 Victoria St., S.W.1. Glasgow: 162 Buchanan St., C.1

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Photograph by courtesy of the Orient Steam Navigation Co. Ltd.

Part of the 1st Class Dining Room

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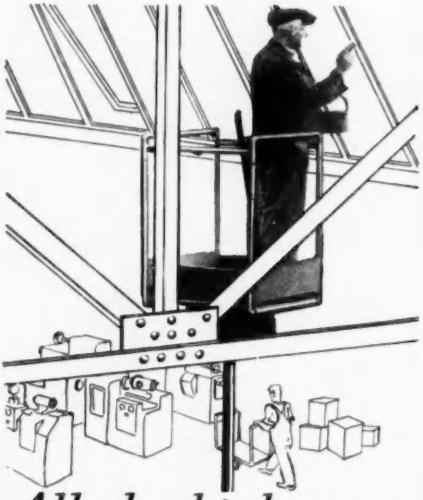
Fluorescent Lighting

on the

R.M.S. ORONSAY

There are twelve hundred fittings using Metrovick Mellow lamps operated from instant-start circuits, installed in all the public rooms, foyers, shops and a number of the first-class cabins.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., ST. PAUL'S CORNER, 1-3 ST. PAUL'S CHURCHYARD, LONDON E.C.4. *Member of the A.E.I. group of companies*



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—in a jiffy!
with the
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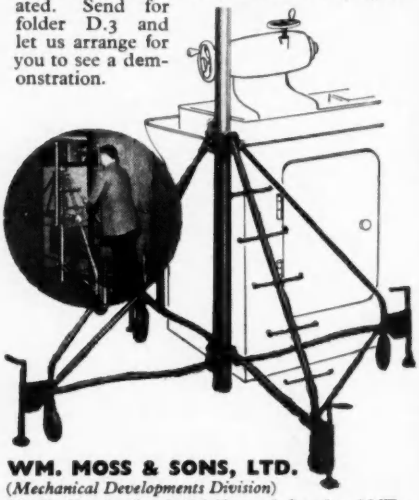
MOBILE HYDRAULIC WORKING PLATFORM

Supersedes timber towers, ladders, trestles, scaffolding. Gives close access to all overhead work—legs span fixed objects. Folds to pass through doorways, narrow gangways and into lifts. Manually or electrically operated. Send for folder D.3 and let us arrange for you to see a demonstration.



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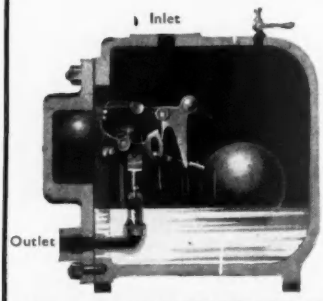
STEAM TRAP



Positive and Instantaneous Opening and Closing.

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Outlet always Sealed.

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Thousands Working.

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Brown Porcelain
LINE INSULATORS
IN STOCK!
PRICE 9D *EACH*

FOR QUANTITIES OF 5,000 OR MORE

These brand new American pattern Insulators measure approximately 5¼" overall and are fitted with a 2½" galvanised wood screw which is lead set into the porcelain base. The porcelain portion measures 3" x 1⅛" and the aperture will accommodate ¼" cable.

CASHMORES
JOHN CASHMORE LTD · GREAT BRIDGE · TIPTON · STAFFS
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CE185

CHECK THAT BOX BEFORE ERECTION

THE SHALLOW BOX SHOULD BE "TWO SHILLINGS" DEEP

THE old type shallow flush box is not deep enough for any Crabtree 5 Amp. "Standard" Flush Switch. *All* Crabtree 5 Amp. flush accessories require a box with an internal depth of $1\frac{1}{8}$". As a rough-and-ready guide, your shallow flush boxes should be as deep as a florin standing on its edge.

CRABTREE

A · NAME · SYNONYMOUS · WITH · PROGRESS · IN · ACCESSORIES · AND · SWITCHGEAR

"Crabtree" (Registered) C.652/110 Advt. of J. A. Crabtree & Co. Ltd., Walsall, Staffs., England

B

There are two sides to the B.N.E. Story

THE DEALER

THE CONSUMER

The dealer is well aware of the skill and care given to the manufacture of the C.49. He also knows its robust construction, the simple technical maintenance and high performance figures. The housewife knows what *she* wants from a cooker—exact and constant heat automatically controlled, a big oven, facilities for easy cleaning, a nice appearance. When the dealer and the housewife get together the answer is usually a B.N.E. C.49.

What it all boils down to is that the B.N.E. C.49 won't gather any dust in your showrooms—it sells like magic! It is backed by extensive trade and consumer press advertising and has been awarded the Good Housekeeping Certificate of Merit.

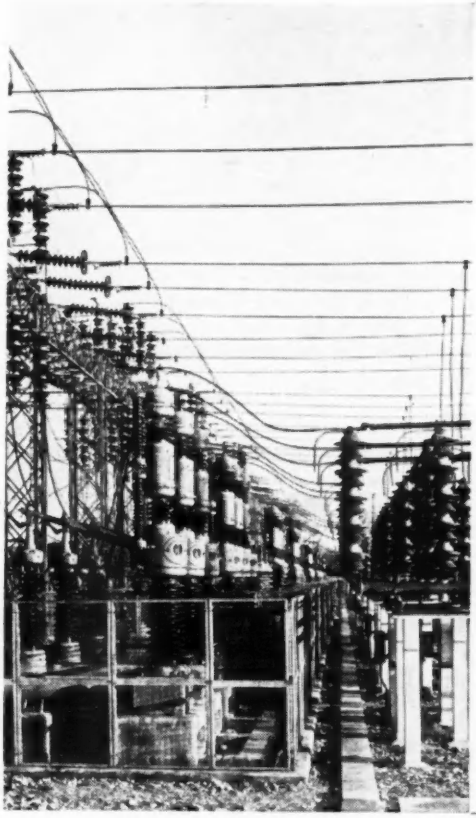
A BNE Product OF JOHNSON & PHILLIPS LTD

BRITISH NATIONAL ELECTRICS LTD.

THE DOMESTIC APPLIANCES SECTION OF
JOHNSON & PHILLIPS LTD.
NEWARTHILL · MOTHERWELL · SCOTLAND

'ENGLISH ELECTRIC'

air-blast switchgear



One of the Range

The 132 kV 2,500 MVA two interrupter circuit-breaker is one of the range of 'ENGLISH ELECTRIC' high voltage air-blast breakers using common interrupters and other standard parts. The illustration shows the Beddington sub-station of the British Electricity Authority where these are installed.

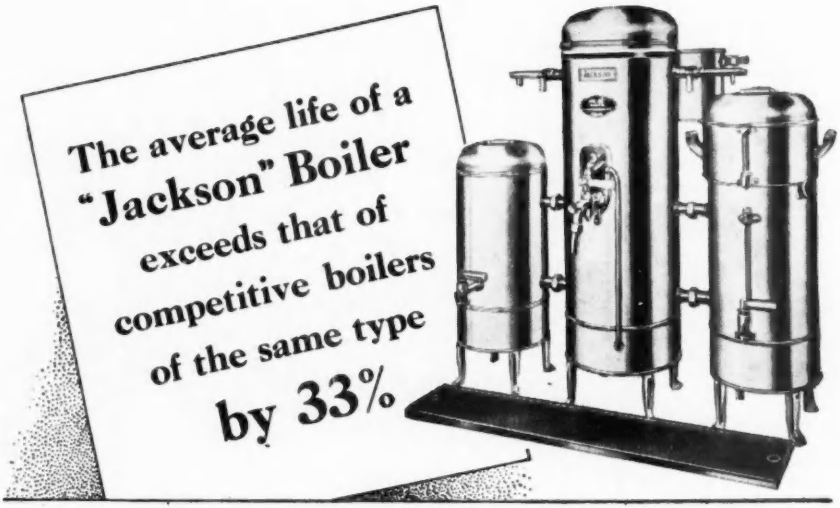
The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Switchgear Department, Stafford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

5H.3



Consider this statement in relation to whatever price you pay for an instantaneous water boiler.

Over and above all this, consider the performance of a "Jackson" compared with that of any other similar type, for it is by performance, better understood as efficiency, that a "Jackson" stands pre-eminent. Further, it is a "de luxe" boiler that will harmonise with the most ornate furnishings that a good caterer takes pride in.

A "Jackson" is your best investment.

Jackson Boilers Ltd.

Vulcan Works Shafton Lane Leeds 11

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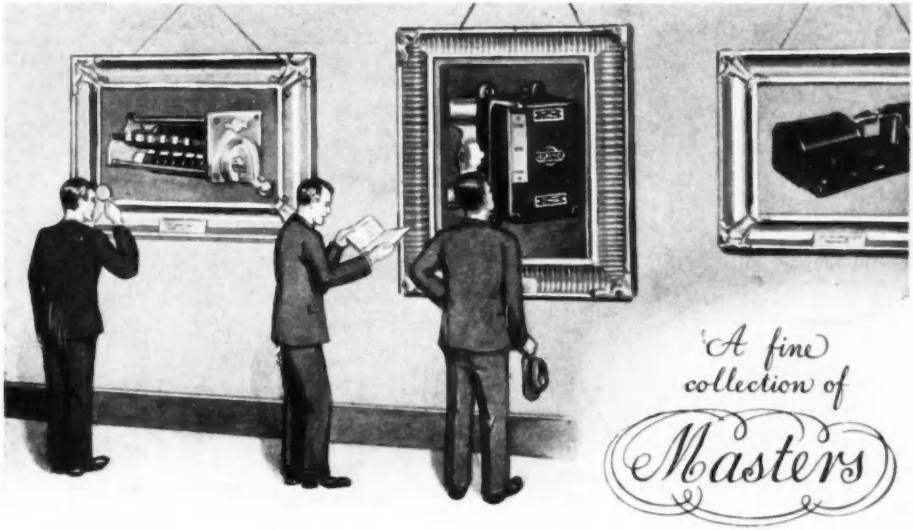

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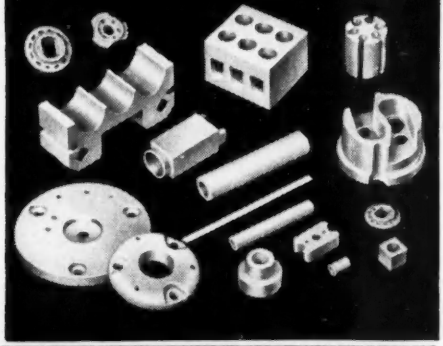

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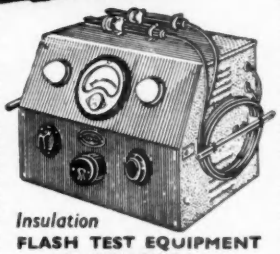

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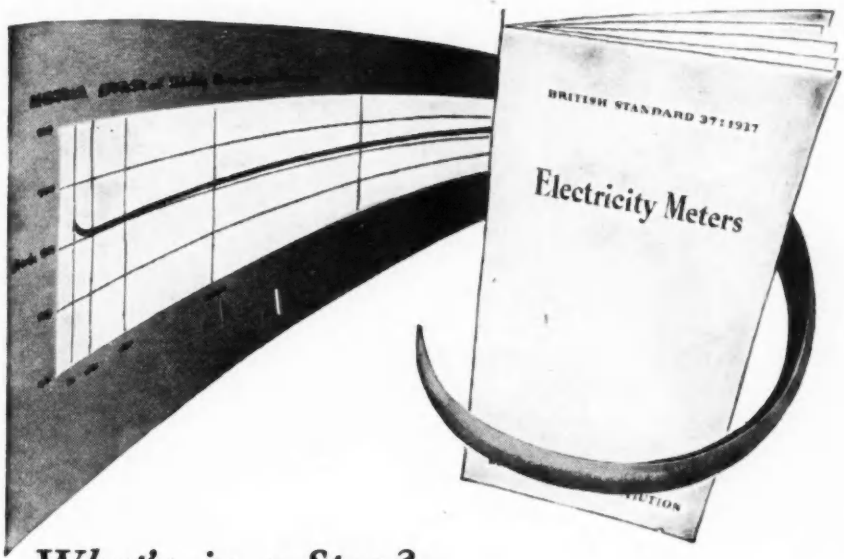

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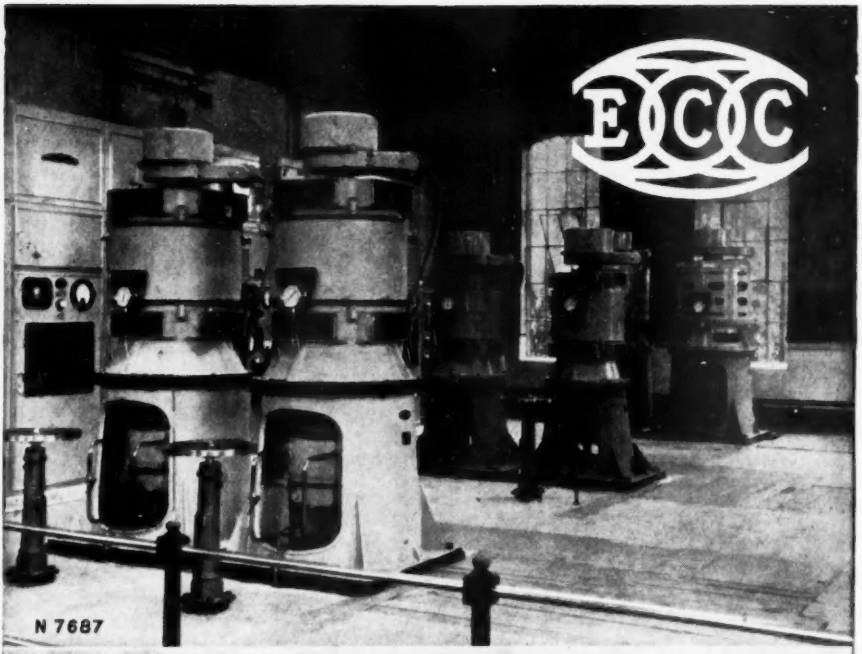

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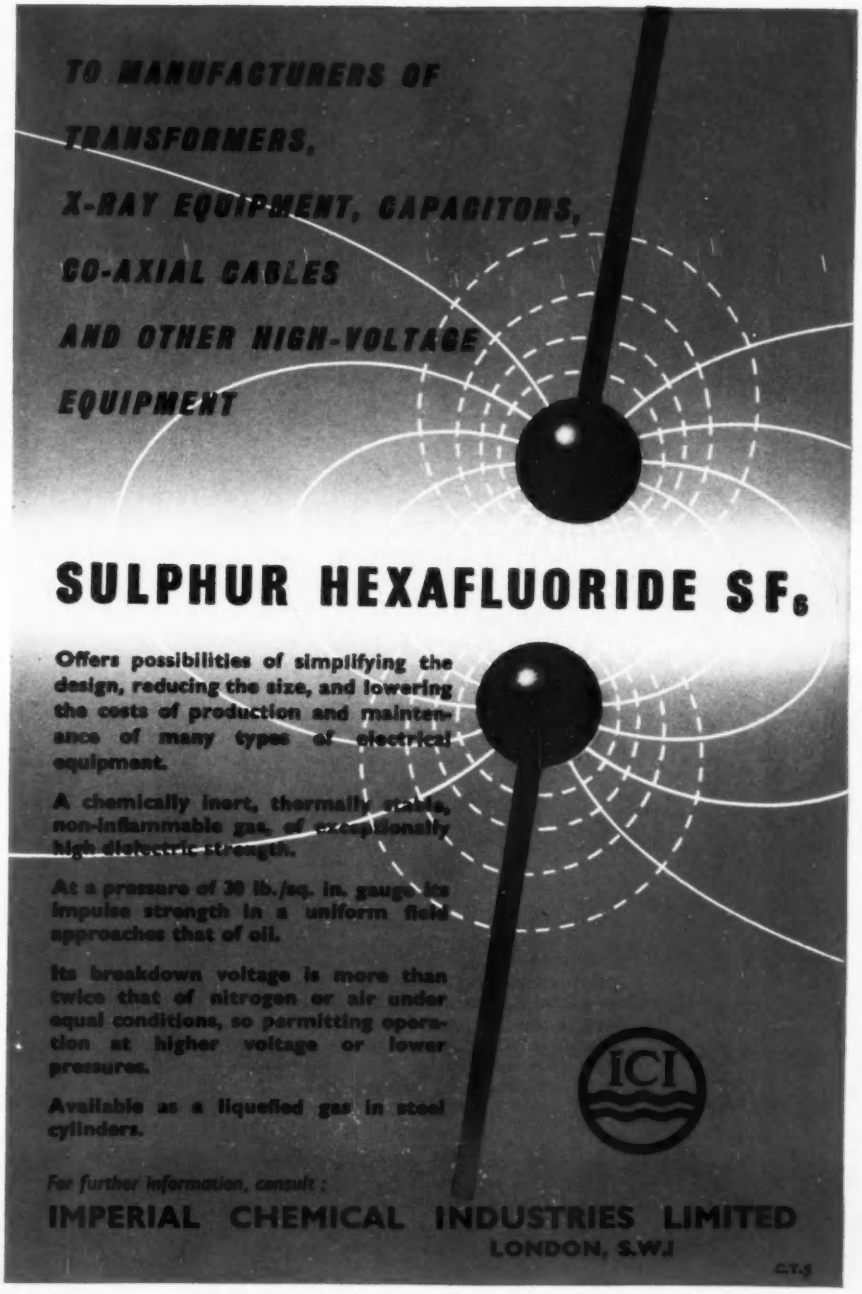
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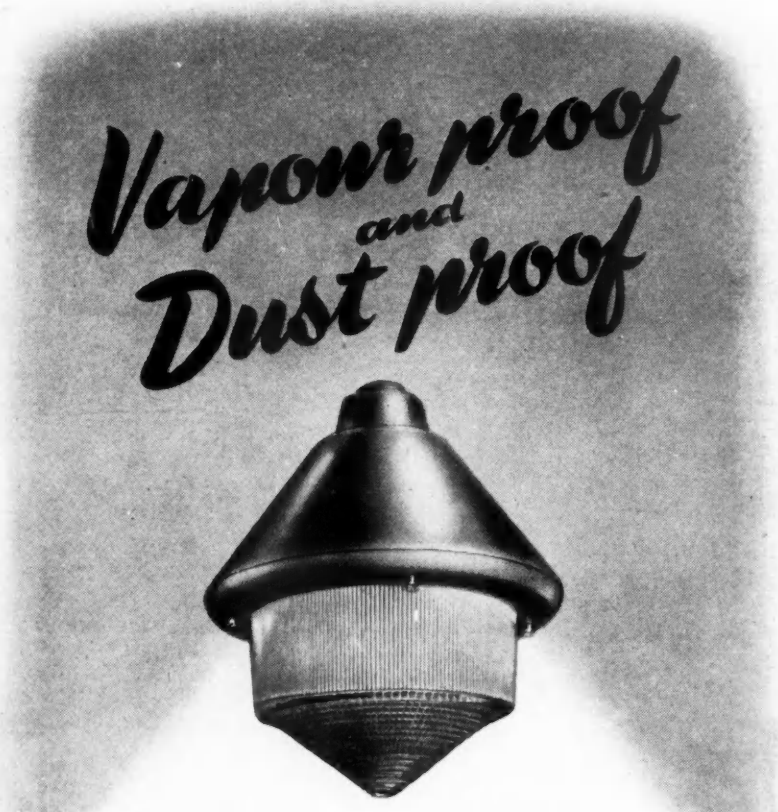

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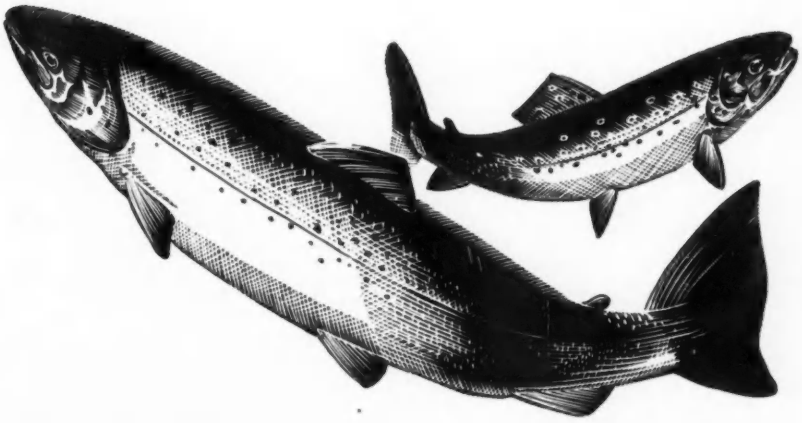

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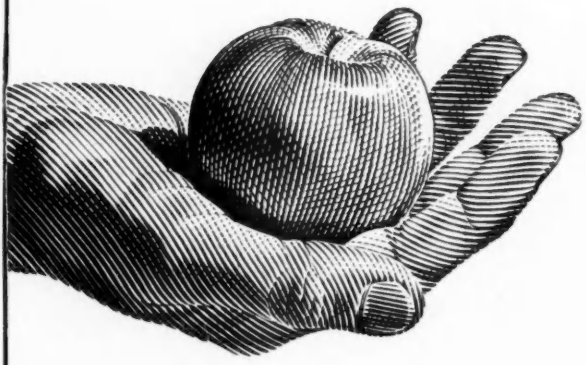

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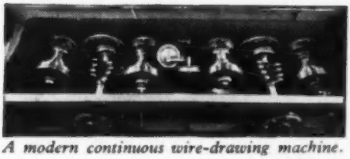

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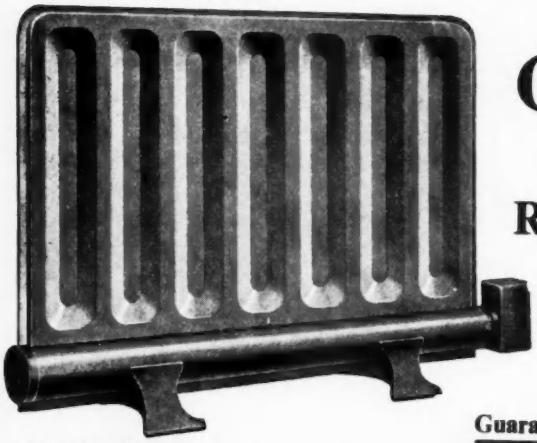

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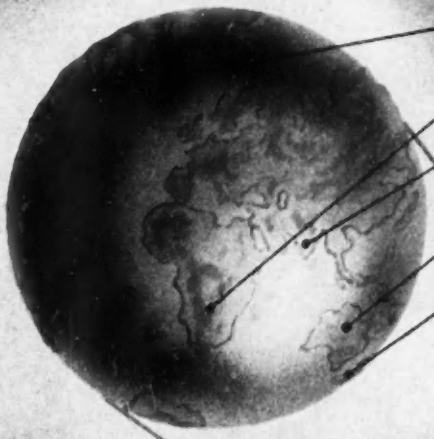

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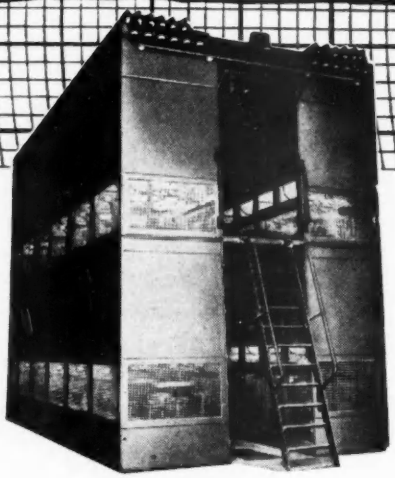

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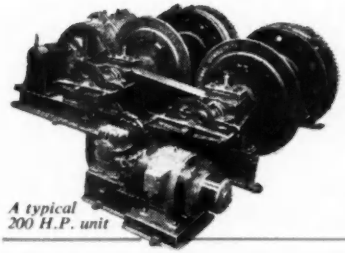

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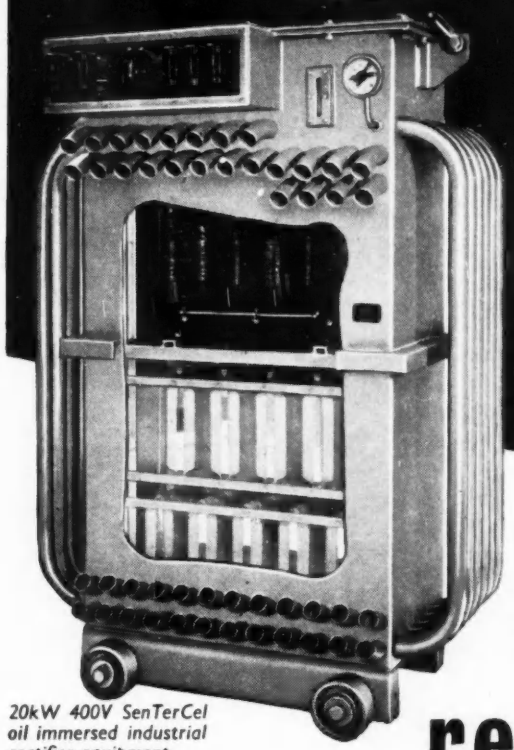

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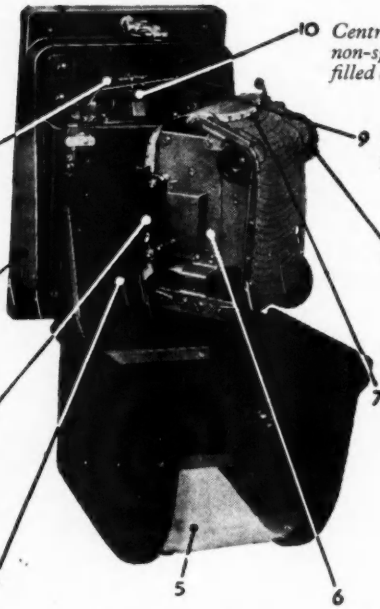

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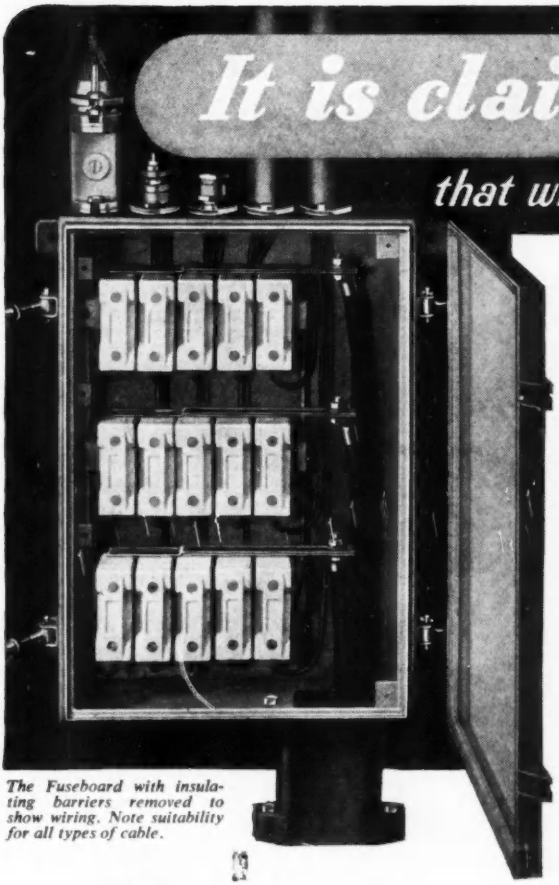

The Fuseboard with insulating barriers removed to show wiring. Note suitability for all types of cable.

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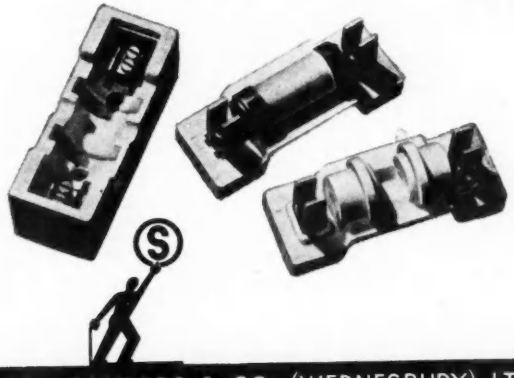

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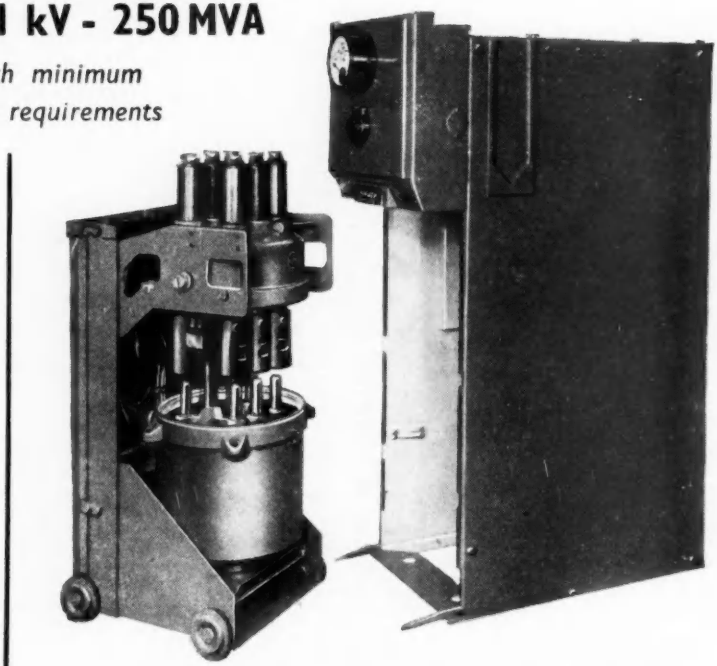

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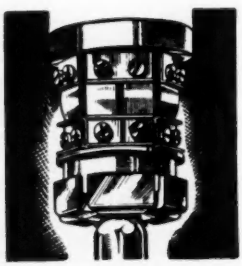

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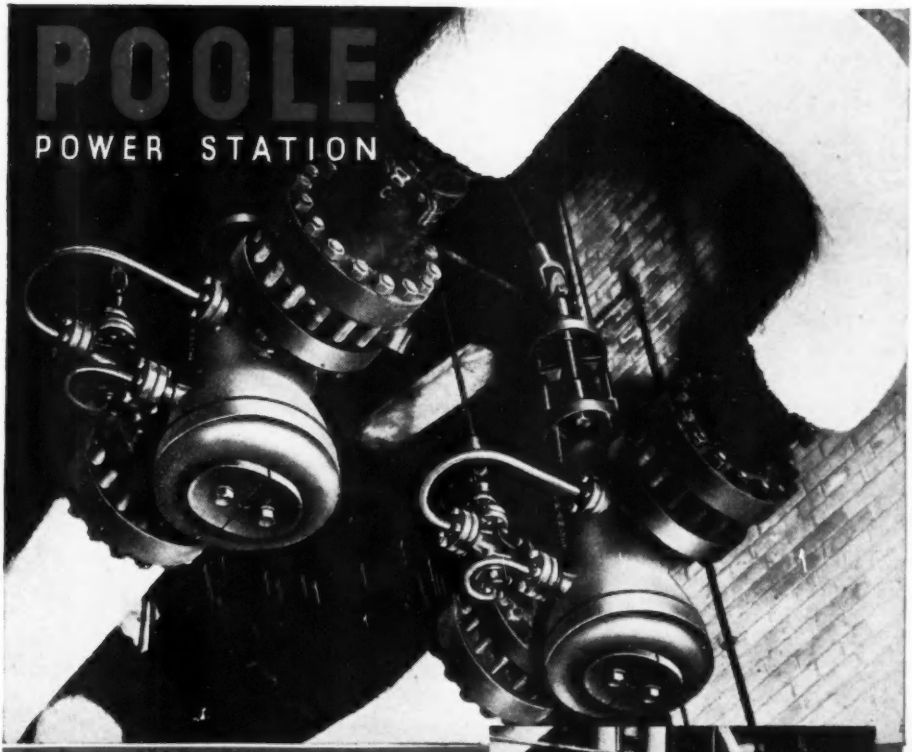

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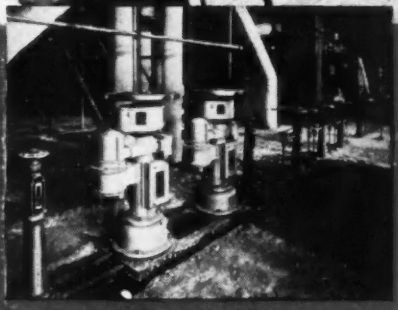

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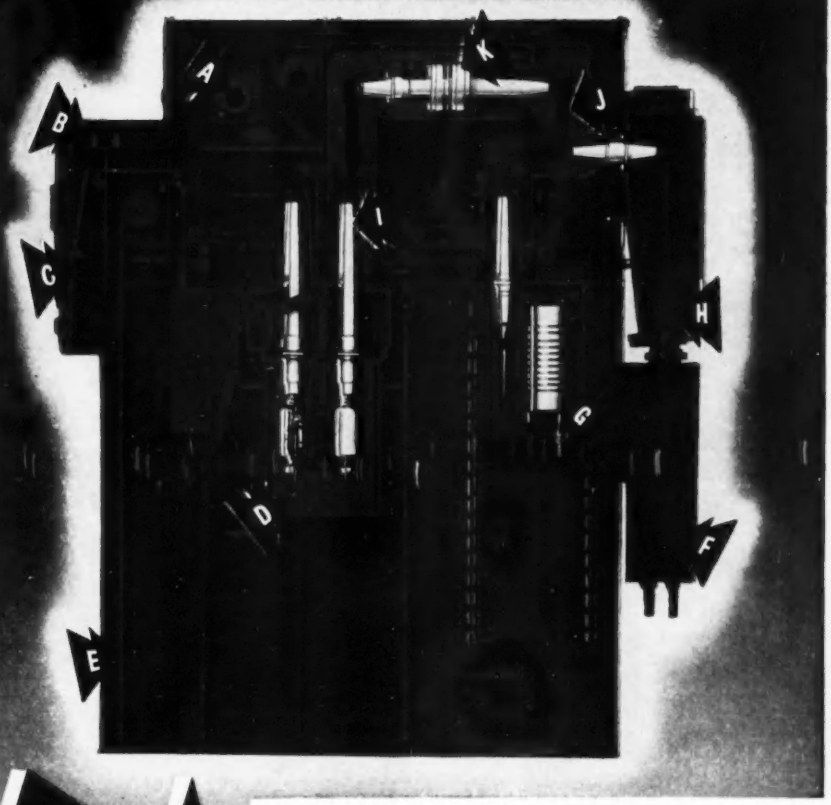

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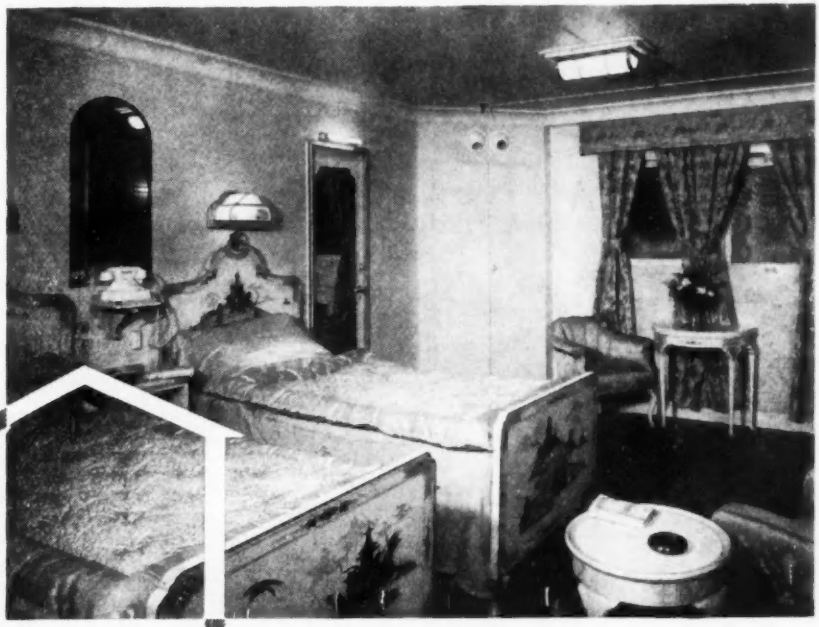

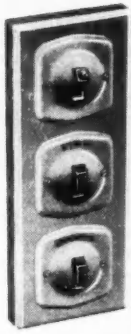

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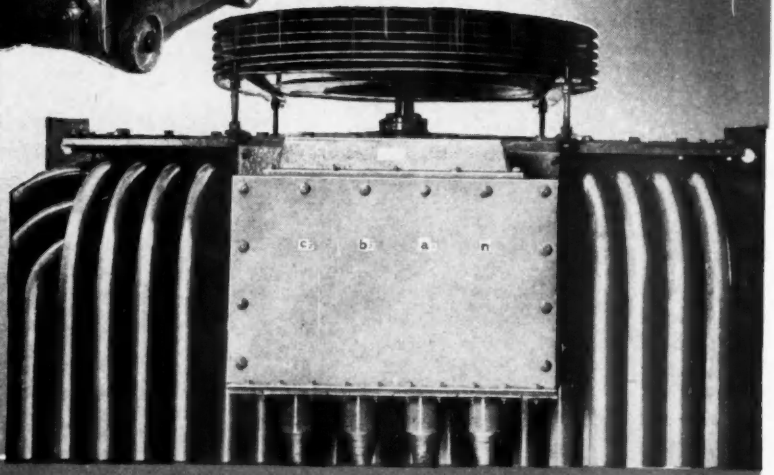

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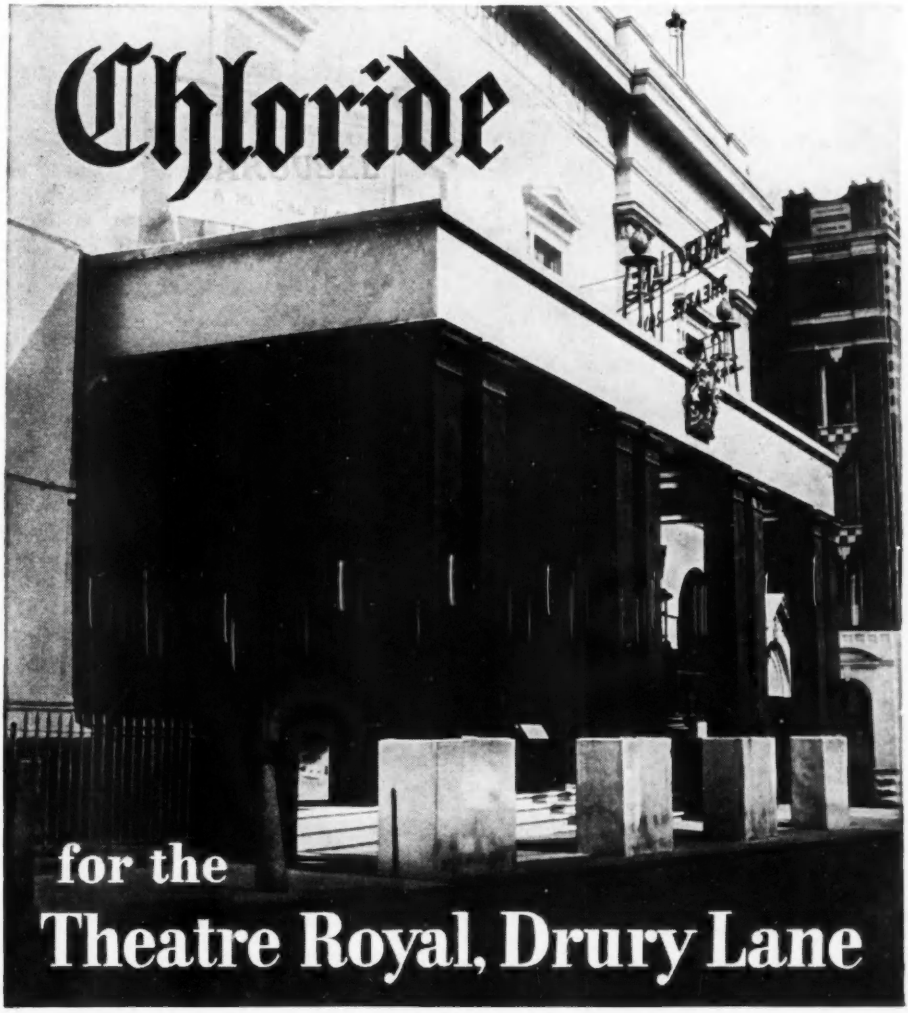

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SIXTY-FIRST YEAR OF PUBLICATION

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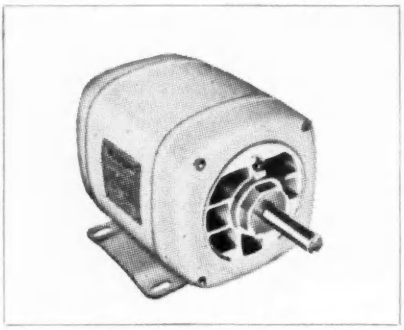

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Editorial

SOLID FUEL COMPLEX

FURTHER evidence of how the solid fuel idea has become ingrained in the Whitehall mentality, is to be found in the Hire Purchase Order, published last week. From the list of appliances to which the order applies, solid fuel burning equipment is specially exempted. Not content with a 100% purchase tax differential, the Government has now added this further bias in favour of solid fuels. The canker of over-simplification, of ignoring all factors other than the single one of efficiency, has spread far beyond the Ministry of Fuel, first to the Treasury and now to the Board of Trade. Was it ever more clear that the time is overdue when the electrical industry should take steps to urge the full facts on the Government? In the absence of any spokesman in the last few years, the case has gone against the electrical industry by default. But this state of affairs cannot continue indefinitely; the matter has become urgent, lest serious injury be done to the nation's fuel economy.

FREIGHT HAULAGE

THE somewhat belated opening of the first section of the Manchester-Sheffield-Wath railway electrification scheme, described at some length in this issue, marks a significant step in the history of railway electrification in Great Britain. For the first time, electric locomotives are being used for heavy freight haulage over a section of track which is particularly suited to exploit to the full all the advantages of electric operation. The severe gradients have for decades been a source of operating difficulty, and in the past it has required four steam locomotives to take the coal trains up the bank from Wath to Dunford Bridge, and two locomotives to control the empty trains returning down the bank. With the ease of control introduced by electrification, only two electric locomotives are required on the haul up, and with regenerative braking, one can control the downward train. Apart from the economy in operation, a considerable speeding-up of traffic is anticipated. When this is allied to the coal saving estimated at some 100,000 tons per annum, the importance of the scheme cannot be underestimated.

GAS TURBINE'S ROLE

IT was perhaps ironic that the first British gas-turbine locomotive should have made its debut during the same week that the first section of the Manchester-Sheffield scheme began operation. The gas-turbine locomotive offers many attractions for railway working, and it may well be that within a few years, many of these units will be running. Apart from considerations of easy maintenance and high availability, the gas turbine locomotive has the advantage of requiring a smaller space/power ratio for its output than any other form of traction, with the exception of the straight electric locomotive. Moreover, although its initial cost is high it has good thermal efficiency and avoids the high capital costs inescapable with electrification schemes. At a time when all large capital expenditures are being ruthlessly pruned, it is probable that the gradual replacement of steam locomotives by gas-turbine locomotives on certain long-distance runs, will be, as a short-term policy at least, more acceptable than any large-scale electrification scheme.

IDEAS ON WIRING

WITH twelve editions issued in 69 years of life, as well as some war-time revisions, both permanent and temporary, which did not rank as such, there is conclusive evidence that the I.E.E. is determined to

keep up to date its Regulations for the Electrical Equipment of Buildings. In furtherance of this policy, work is now about to be started on a new edition only some 20 months after the last was published. Announcing this at last week's E.C.A. dinner, the I.E.E. president invited all who had ideas for desirable revisions to the Regulations to send them to the responsible committee. This committee is, in its membership, representative of a very wide range of relevant interests, but this search for still further sources of ideas is all to the good where a code affecting so many people is in question. Might not the I.E.E. then, with benefit take their idea a step further, and convene, both in London and at local centres, general discussion on the twelfth edition? Such an arrangement has been successfully applied, directly or indirectly, where radical alterations were under consideration; might it not prove almost as effective where the minutæ of the Regulations are concerned? Premature indication of the committee's ideas on desirable changes would not be necessary, though some flag flying by official spokesmen could be helpful in provoking reactions for the information of the committee.

HOUSES OR MACHINES

SIR WALTER MONCKTON, the Minister of Labour, has lost no opportunity of emphasising that his new Notification of Vacancies Order is purely voluntary so far as the employee is concerned. If he wants a particular job, only persistence is necessary to make the labour exchange permit his applying for it. The order relies for its effect on the idea that most tradesmen will take their choice from the exchange officials' earlier suggestions. This point was taken up by the President of the E.C.A. at the Association's annual dinner last week. During the war years the Control of Engagements order, he alleged, made it easy for factories to obtain electricians by pleading essential contracts. They accordingly increased their electrical staffs more than was necessary while contractors, engaged on no single vital item of work, could not get the priority of recommendation which they needed if their manpower was to be kept up to strength. The President feared that the new Order might work similarly. Set against this point must be the complaint often made by works engineers, that good maintenance electricians are hard to come by, someone of higher quality than the average house-wiring craftsman being called for. With any breakdown in production due to electrical faults a costly business, factories may well consider a reserve of electricians a worthwhile overhead expense, and so place their requirements high. On balance, though, there does seem to be a case against any complete exclusion of contractors from "preferred" lists in favour of factories, and it is to be hoped that this will be brought to the notice of local Ministry of Labour officials.

TELESNOOPING

TRADITIONALLY, M.P.s dislike any action that can be classified under that ugly but expressive term "snooping." Perhaps it was this feeling that inspired one of their number to ask for details of the new Post Office method of detecting viewers who do not pay their TV licences. *Meteor* is wondering what he made of the answer he received. It was surprisingly full, and it introduced the House (with illustrations) to harmonics and the inverse square law. Mercifully, for non-technical members, it was a written answer. But though they did not have to listen to its delivery, most of them will have to study electrical technology to quite a high standard to appreciate its meaning. There exists the slight but intriguing possibility that concern for the privacy of the citizen may persuade some of the more intrepid amongst them so to do. If this comes about, their subsequent well-informed contributions to debates will be well worth the cost to revenue of an answer that has told secret viewers how a small quantity of mumetal, strategically sited, will make their sets safe from detection.

Meteor

Manchester-Sheffield Electrification

First stage of Trans-Pennine Scheme commences operation

THE completion of electrification of the first section of the Manchester-Sheffield-Wath system, marks a significant milestone in the history of British railways. It may be remembered that progress on this scheme and a general review of the circumstances leading to the electrification of this particularly difficult stretch of line, was published in our issue of February 23, 1950; a short résumé, however, of this background is given in this article.

The line itself is one of the most difficult from an operating and maintenance viewpoint, in the country. This is mainly due to the heavy traffic density, involving much coal haulage, the severe gradients and the presence of the Woodhead tunnel. The scheme for the electrification of the line was first approved by the directors of the L.N.E.R. in 1936, and work began prior to the outbreak of war in September, 1939. Hostilities, however, precluded further work on the scheme, and it lay fallow until 1948, when work was recommenced. Some 75 miles of route and a total of 330 miles of track will ultimately be electrified, the original scheme being to carry out the work in four stages. These are: (1) Wath-Dunford Bridge, (2) Dunford Bridge-Manchester (London Road), (3) Sheffield-Barnsley, and (4) Fairfield Junction-Manchester (Central).

Of these four stages, the first is now open to traffic. This involves the numerous sidings at Wath (Elsecar) a complex system at Penistone, and the section Penistone to Dunford Bridge. The traffic on this section is particularly heavy consisting largely of coal trains which have to be hauled up the slope from Wath to Penistone. In the past a fully loaded coal train required four steam locomotives to take it up the severe gradient. Now the same task is performed by two electric locomotives. Taking loose-coupled trains down the bank required two steam locomotives. This can now be performed by one electric locomotive using regenerative braking.

Civil Works

The civil works in connection with the scheme presented considerable difficulty, mainly due to the fact that the area round Wath is being extensively worked for coal-mining, and in consequence subsidences of alarming proportions must be catered for. So far as the bridges are concerned these were to a certain extent stone arches, for which there was insufficient clearance, and no great problems were faced in connection with these except for those in the Wath area. To enable the bridges to be raised in the event of further subsidence, the cross members were made of pre-stressed concrete and jacking beams were placed on top of the abutments with jacking pockets let into the face, so that if necessary the decks could easily be raised in the event of further sinking.

The main problems arose in connection with the construction of exchange sidings and an

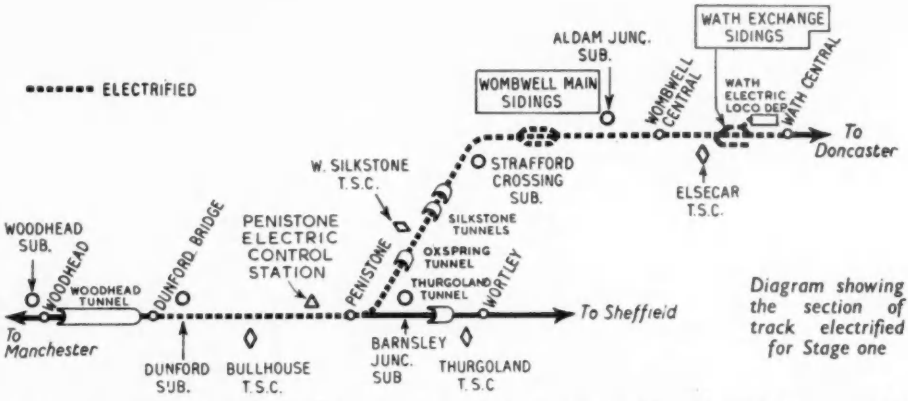


Diagram showing the section of track electrified for Stage one

electric locomotive depot at Wath. Immediately prior to the beginning of this work it was learned that there would be an anticipated sinking of about five feet over the area of the work.

Locomotive Shed

In view of this condition it was decided to construct the locomotive shed with independent engine pits, hinged in short lengths throughout. It was also decided to design the shed as a series of braced portal frames, with two anchor frames at each end of the shed. The intermediate frames were in pairs double hinged at each foot and connected to the next pair with side rails in which slotted joints were provided, to allow for movement taking place and to enable the shed to settle without any serious distortion.

G.E.C. fluorescent lighting is a feature of the operations room at Penistone electric control station

At the time the foundations were completed the draw from mining subsidence was beginning to take place, and about January, 1950, the effect of draw was noticed on gas and water pipes which had been laid but not finally connected up to the main services. The draw was also noticed on the tracks, the coach screws being pulled out of the chairs and some chairs broken. The draw within one month registered a sinking of over 12 in. between Moor Road Bridge and the shed, a distance of 400 ft. The sinking over the next seven months reached 3 ft 9 in. The draw passed westwards along the building and reached a depth of approximately 3 ft at the east end and 2 ft 9 in. at the west end of the shed when it was noticed that the levels had become more or less constant, suggesting that the draw had for the time being, ceased.

Apart from the movement reflected in the slotted holes in the side rails there was little other evidence that sinking had taken place as no distortion of the structure showed except where portions of the slab floor had to be relaid due to misalignment or cracking.

A turntable along with engine pits had to be provided for the exchange of steam locomotives and in view of the ground difficulties it was decided to construct the foundation in pre-stressed concrete with post tensioned wire to a cartwheel design. This is an entirely novel construction for this type of work.

The whole formation of the site from the

This cantilever structure suspension is used at Wombwell

exchange sidings to shed and turntable was made up by taking inert spoil from the adjacent tip of the Wath Main Colliery. This was an excellent and useful material and it consolidated in a short time. The weather was fortunately dry and when the rain came consolidation was most rapid and the spoil provided a good foundation for tracks and other works, being free from mud.

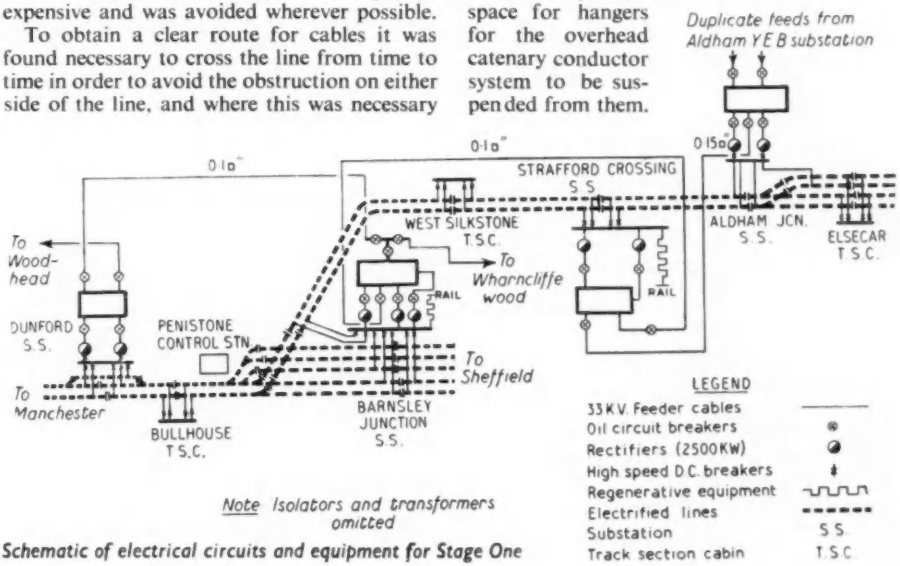
Other Works

In addition to the foregoing works there were many other items which are worth mentioning which had to be undertaken concurrently with the operations of other departments' contractors. Amongst these are the alterations and slewing of a considerable number of layouts in yards in order to obtain statutory clearance for stock, arising, principally, from overhead line equipment at certain structures. In some cases where improvement could be effected by lowering tracks under bridges a method of obtaining clearance was found in this manner, but this proved expensive and was avoided wherever possible.

To obtain a clear route for cables it was found necessary to cross the line from time to time in order to avoid the obstruction on either side of the line, and where this was necessary cables crossed under the track through banks of asbestos cement ducts in mass concrete at a depth of 3 ft 6 in. below sleeper level.

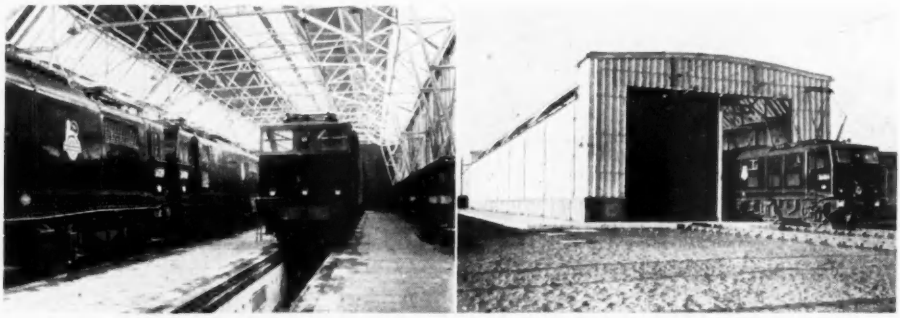
These crossings were numerous, and involved, in many instances the possession of the track while the work was carried out and the placing of way beams during excavation.

The overhead fixtures in Silkstone and Oxspring Tunnels were provided by the use of old rails, bent to conform with the outline of the tunnel roof and set in the tunnel walls. The ribs were constructed of two rails welded together, with distance pieces, in order to provide space for hangers for the overhead catenary conductor system to be suspended from them.



Note Isolators and transformers omitted

Schematic of electrical circuits and equipment for Stage One



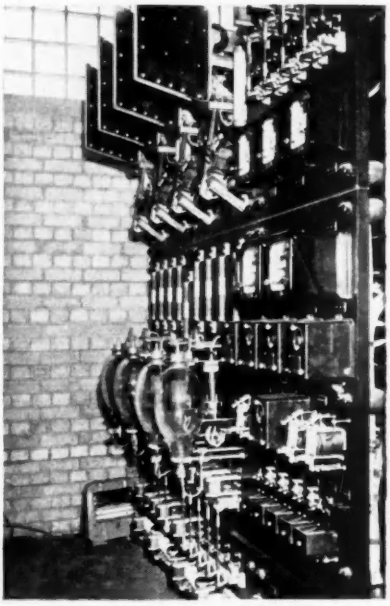
Recent photographs of Wath motive power shed to show the track pits and portal construction

A number of level crossings were closed and at those remaining it was necessary to provide some form of overhead load gauge to give warning to road vehicle drivers where the load exceeded the height of the contact catenary. In addition many footbridges had to be raised to a height of 20 ft.

At footbridges where parapets were of the open lattice type special precautions had to be provided, where the overhead line passed underneath the bridge, to give protection to children and others. In cases where the parapet could be raised, without affecting the structure, this was done to a height of 6 ft. The parapets on all reconstructed bridges over electrified lines were raised to 6 ft.

Apart from the works referred to above, and a few relay rooms, substations, track sectioning cabins, etc., the electrification made very little physical change to the existing features of the line under steam operation.

The interior of Barnsley Junction substation showing electronically controlled regenerative equipment



Power Supply

Power is supplied from the B.E.A.'s substation at Aldham, and is distributed to the traction substations by 33 kV Henley's cables routed along the tracks. Each of the traction substations contains e.h.t. outdoor switchgear for controlling the power supply between distribution feeders and busbars, and between the busbars and the outdoor step-down rectifier transformers.

Mercury arc rectifiers of the continuously pumped steel tank type are used for the conversion to 1,500 V d.c. for the catenary system. Three of the substations contain two 12-anode units, the fourth—Barnsley Junction—containing three. Each rectifier is rated at 2,500 kW and can carry short overloads of up to 10,000 kW. The total installed capacity of this section of the line is 22,500 kW.

Protective relays, local control switches and supervisory gear for remote control, together with d.c. smoothing equipment are installed in each substation. The 1,500 V d.c. supply to overhead lines is switched and protected by high-speed circuit-breakers, and track sectioning cabins, also fitted with high-speed circuit-breakers, are located between most substations to limit voltage drops and enable fault clearance to be more effective. Two of the substations at Strafford Crossing and Barnsley Junction are also equipped with resistance banks with electronic control capable of absorbing 900 kW. These enable regenerative braking to be used without excessive voltage

rise even when there are no further locomotives on the section to absorb the regenerated power produced by braking.

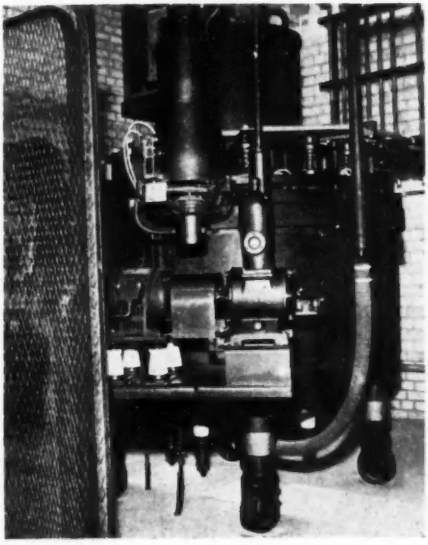
Normally the substations and track sectioning cabins are unattended and are remotely controlled from the central control station at Penistone by means of pilot cables routed alongside the tracks. The control equipment consists of an indicating master control panel which may be switched as required to any substation or track sectioning cabin for operational purposes and indication of the position of the equipment therein. Remote metering of e.h.t. and d.c. busbar voltages and of rectifier output is also available at the Control Station.

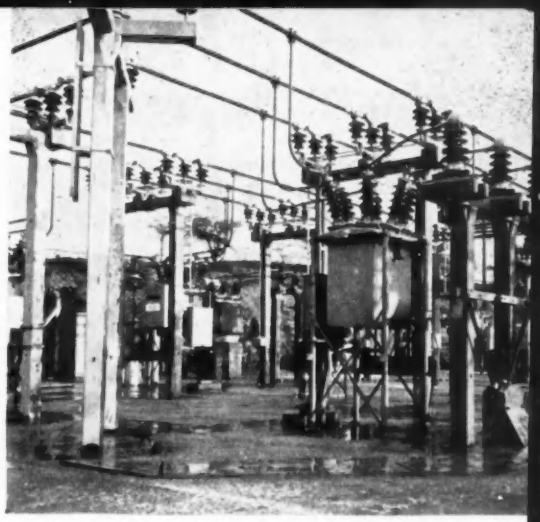
E.H.T. and Pilot Cables

The 33 kV supply cables are of the three-core screened, single lead single wire armoured and served type, and the pilot cables are 7- and 4-star quad types. Normally they are carried on cast iron hangers mounted on concrete posts, but where obstructions are met they run in precast concrete trough laid with the lids at surface level.

Precautions have again had to be taken in the subsidence areas. As a result of two years' observation on an experimental cable route, special long reinforced concrete posts have been installed and the cables are carried in asbestos covered steel troughing mounted on these posts. Concrete cable bridges are inserted in the troughing midway between the post positions. Arrangements are also made for slack cable to provide for subsidence at track crossings.

Barnsley Junction substation showing one of the pumped steel-tank rectifiers





Barnsley substation exterior showing the 33 kV ring main and circuit-breakers

The longest continuous run of 33 kV feeder in Stage I is a 583 yd length laid through the Oxspring Tunnel, where restricted clearance did not permit the making of a straight through joint. Barrier joints are installed in the 33 kV cable where it traverses the 1 in 40 gradient of the Wath Bank.

Overhead Equipment

The overhead equipment is of the compound catenary type giving a total copper equivalent section of 0·75 sq in. As, where subsidence occurs, the track is packed up to maintain correct grading it was essential to design the supporting structures so that they can be adjusted to maintain correct clearances. All masts, bridges and cross-spans in the affected area are therefore capable of alteration to maintain the height of the conductor wire relative to the track.

Where the number of parallel tracks does not exceed four, steel portals constructed from broad flange beams are used as supports. Where there are more than four, lattice type structures are generally used, except in the subsidence areas, where advantage has been taken of the more easily adjusted cross track catenary (head span) construction.

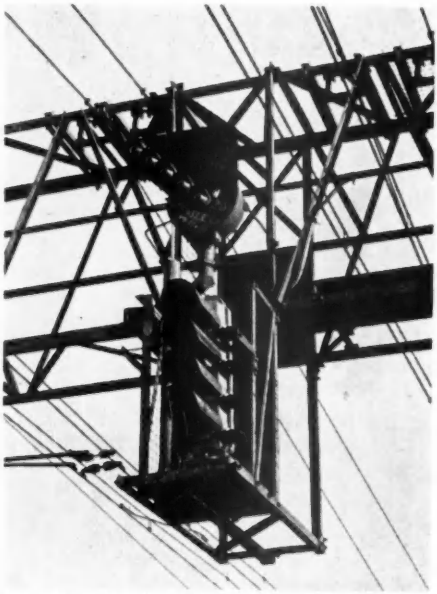
Locomotives

A total of 65 locomotives are being provided for the scheme of which 58 will be of the

Bo+Bo type. For Stage I some 30 of the latter will be put into service. Full technical details of the electrical system of these locomotives have not yet been generally released. They are, however, of the double bogie, four-motor, four-axle type having a continuous rating of 1,360 h.p. at 56 m.p.h. and a one hour rating of 1,868 h.p. at 45 m.p.h. The maximum tractive effort at starting will be 45,000 lb for an overall engine weight of 88 tons, and as they are mainly for goods haulage the maximum speed is about 65 m.p.h.

Control gear is of the electro-pneumatic type and Westinghouse air brakes are fitted, as well as facilities for the vacuum braking of passenger and freight trains if necessary. The prototype of this locomotive, No. 6,000, was sent to Holland in 1947 and since that date has covered approximately 325,000 miles in service.

Largely as a result of this experience, certain modifications have been made to the layout of the electrical equipment, notably in the driving cabs which have been enlarged. The master controller, instruments and other cab equipment have been built into a sloping desk and inclined instrument panel, resulting in added comfort and ease of control for the driver. Electric window heaters have also been added to maintain clear vision in cold weather.



Colour light signal on combined overhead and signal structure carrying Barnsley Junction up main home signal and junction indicator

A headspan tower base and foundation. The base channels are extended so that a jack can be used to plumb the tower after any ground subsidence

Vokes type dry air filters have been fitted as part of the mechanical section to all ventilating louvres, so that the internal air can be kept free from dirt and dust with consequent lessened maintenance of the electrical control equipment and the traction motors.

Signalling

The main alterations in the signalling system involve the conversion of the existing d.c. track circuiting to a.c., the moving out of the distant signals on the main lines to give increased braking distances, and their conversion to colour light type; various small re-signalling schemes, and the cabling of the overhead telegraph wires as required.

In connection with the provision of locomotive exchange facilities at Wath, Elsecar Junction and Wombwell Main Junction, new colour light signals have been installed. Points situated beyond the mechanical working distance have been fitted with electrical point machines operating on 110 V d.c.

At Wombwell Main Junction and Elsecar Junction the electrically operated points, together with the colour light signals, are worked from small panels fixed over the centre portion of the mechanical lever frames and

electrically interlocked therewith. A new 90-lever mechanical frame has been installed at Barnsley Junction signalbox in connection with additional loco facilities which have been provided.

In the Penistone area it was necessary to convert a number of signals to colour light type in order to dispense with the semaphore signal gantries and brackets which prevented the traction catenary equipment from being erected. Throughout the area it has been necessary to make alterations to signalling equipment in order to make way for the overhead line structures.

All the overhead open wire circuits for telecommunications have been cabled throughout the electrified area. Paper insulated, lead covered cable has been used, and, in general, run on a stake route at the side of the track. Repeaters have been provided where necessary.

The new signalling and track circuits are supplied with power taken from the traction substations and distributed throughout the area at 660 volts, stepped down to 110 volts at the various signal locations, etc., as required. Standby power equipment has been provided at Aldham for the Wath area in order to provide a signalling supply in the event of a serious fall in voltage or frequency of the incoming supply.

The set consists of a 40 h.p. diesel engine directly coupled to an alternator, having an output of 25 kVA 415 V three-phase, 50 c/s. The normal supply from the traction substation is at 415 V three-phase 50 c/s, and is transformed to 660 V single-phase by three-phase to single-phase transformers.

Remote Control

The supervisory control equipment at Peniston is known as the "Common Equipment System" and has the advantage that it is of standardised design and can be applied to any traction distribution network with only minor modifications as may be dictated by local conditions. This enables a great saving to be made in control room space when compared with any other type of system at present available.

The illuminated mimic diagram is manually dressed on information supplied by the master control panel. Initially the supervisory system can handle 23 remote stations (11 substations and 12 track circuiting stations), but the control desk and equipment have capacity for up to 36 such stations.

ELECTRICAL CONTRACTORS

Substations

Main Contractor: Bruce Peebles and Co., Ltd., Edinburgh.

Sub-Contractors: A. Reyrolle and Co., Ltd., Hebburn, Co. Durham; British Thomson-Houston Co., Ltd., Rugby; Standard Telephones and Cables, Ltd., London.

Cables

Main Contractor: W. T. Henley's Telegraph Works Co., Ltd., London.

Sub-Contractor: Standard Telephones and Cables, Ltd., London.

Overhead Line Equipment

Main Contractor: British Insulated Callender's Cables, Ltd., London.

Sub-Contractors: Cargo Fleet Iron Co., Ltd., Stockton-on-Tees; Redpath Brown, Ltd., Manchester; Robinson and Kershaw, Ltd., Manchester; Bullers, Ltd., London.

Electric Locomotives

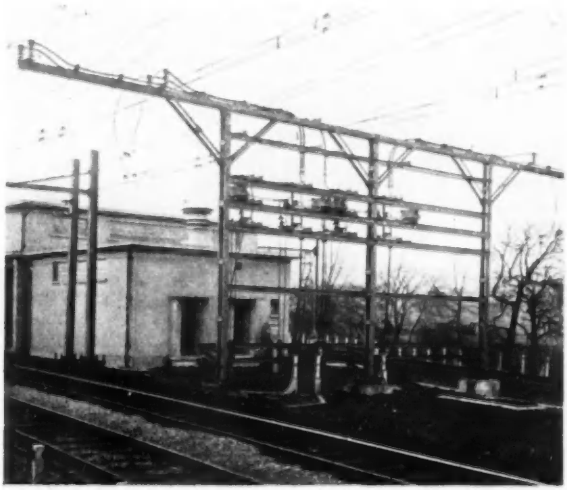
Main Contractor: The Metropolitan-Vickers Electrical Co., Ltd., Manchester.

Sub-Contractors: Westinghouse Brake and Signal Co., Ltd., London; Pritchett and Gold and E.P.S., London.

Penistone Control Room

Main Contractor: Bruce Peebles and Co., Ltd., Edinburgh.

Sub-Contractor: Standard Telephones and Cables, Ltd., London.



Aldham Junction substation switch gantry and feeders

Our readers' views . . .

on Domestic Electric Heating

PROFESSOR SIMON in your issue of January 24 has satisfied himself that a colossal saving of coal would result from the introduction of a cheap tariff for all legitimate uses of electricity but with a very high price everything in excess. He also claims that if proper methods of heating were used it would change our economic position completely.

It would, of course, be necessary to define what is a legitimate use of electricity. An electric cooker is largely responsible for the midday peak in winter so that this useful piece of apparatus might not be regarded favourably.

Less coal is consumed in supplying many households with electricity for heating than would be the case if any other form of heating were used. Where both man and wife are out at work all day is one example and another is a single person occupying a bed sittingroom.

This is a time of shortages of both labour and materials and there are many sides to our economic difficulties. If, for instance, electric heating were prohibited, fewer women would go out to work and industry needs more. Also in many of the new houses instead of installing electric fires, flues would have to be provided for the proposed efficient stoves. Building materials and labour, which are in very short supply, would be needed, and steel for the stoves would also be required. When the houses were occupied it is doubtful whether a great saving of coal would result. In many cases the stoves would be using coal for much longer hours than is the case with the electric fires. The overall capital cost of supplying and installing the stoves would be far greater than for the electric fire. A portable electric fire can be moved from room to room but a stove would have to be installed in every room used. Extra capital would be needed and it is desirable, at present, to limit capital expenditure.

As regards the effect of prohibiting electric space heating it seems fairly certain that there would be a steep rise in price of electricity to all consumers. The B.E.A. would have to recover its capital charges by the sale of fewer units at a lower load factor. We should approach the conditions of some years back when power and lighting were the two predominant loads and when electricity cost more although the price of coal was lower than it is today. Industry would pay more for its electricity and wages would have to rise to meet the extra cost of living for the workers. As a result the cost of commodities would rise. This would not help our national economy.

It is easy for Professor Simon to say that anyone who rejects this proposal is under an obligation to provide an alternative solution for our hard-pressed economy, but a number of proposals have been put forward which would save millions of tons of coal and improve efficiency. Capital restrictions and shortage of labour and material prevent them being carried out.

Professor Simon's proposals would not save the amount of coal which he claims and it would not improve the nation's efficiency.

B. Crowsley
A.M.I.E.E.

WELWYN GARDEN CITY.

◆ ◆ ◆

THE average British house in winter certainly provides poor comfort, and its traditional open fire and wretched heat insulation deserve every harsh word that Professor Simon gives them.

It is not, however, certain that the universal use of closed combustion stoves would save as much coal as might at first be thought. Most people would take their full coal allocation as at present, burn it in their new stove, and obtain increased room temperatures and hot-water supplies. This surmise is borne out by the behaviour of miners with concessionary coal who have houses with high-efficiency stoves.

Further, the stoves would usually be kept burning continuously, whereas in many households the coal fire is lit only between midday and bedtime, the electric fire being used during breakfast.

The final result might well be that not enough coal would be saved to justify the use of labour and materials for manufacturing and installing modern stoves on a large scale.

Selwyn Palmer
B.Sc. (Eng).

STAFFORD.

PROFESSOR SIMON puts forward strong arguments against electricity as a main source of domestic heating.

It is a pity that there are so few installations of this kind that their conversion to solid fuel would have no appreciable effect on our national economy.

E. C. Claydon

EASTBOURNE

◆ ◆ ◆

I HAVE known an electricity board refuse to sell electric fires to consumers for whom the board itself has installed points for heating during off-peak hours only. At the same time shops nearby have been selling poor quality electric fires. The consumers have thus been denied the purchase of good quality appliances from the electricity board, but have been allowed to buy rubbish elsewhere.

The ease with which thermostatic control can be applied to electric heating is one of its greatest advantages, as there is no doubt that thermostatic control can effect great economies in consumption. Thermostatic control should be much more widely used, and those electric fires and heaters which do not possess a built-in thermostat should have sockets into which the lead from a room thermostat can be easily plugged. .

The article on thermal storage space heating in Ireland in the ELECTRICAL TIMES dated January 24, 1952, page 163, was very interesting. When will all the electricity boards in England sell thermal storage space heaters themselves; and, what is even more important, issue a special low tariff for domestic thermal storage space heating?

Progress

WALTHAMSTOW

◆ ◆ ◆

I HAVE been interested to read Professor Simon's article appearing in your issue of January 24 on the above subject.

Methods of electric and other forms of heating and efficient means of reducing fuel consumption should be investigated by a panel of experts appointed by the Government.

With regard to domestic heating, electric fires are the culprits. The alarming changeover to electric space heating is due undoubtedly to the shortage and high cost of other types of fuel. As Professor Simon says, the most modern power stations have a conversion efficiency of 30%, while the average is only 20%. Thus electric fires utilise the coal used to produce electricity at only 20%. A saving in the use of electricity for water-heating in office blocks could be made by the more extensive use of spring-loaded hot-water taps. The total number of wasted B.Th.U.s poured down the drain must be considerable. Lagging of hot-water tanks is a subject which has been referred to so often in the press that it has become wearisome —it still needs emphasising. The question of heating for offices, canteens, workshops, blocks, etc., connected with power stations should also receive serious consideration.

With the numerous sources of heat—e.g., hot gases, steam and hot water which are available—I can never understand the reasons for not making use of these sources for obtaining heat. Although the percentage of electricity used for heating is only a fraction of the electricity generated, it is the resultant electric heating load at a large number of power stations which becomes serious.

The electricity saved would, of course, be available for the Grid system.

T. Simmons

BIRMINGHAM 20

◆ ◆ ◆

Conduit Continuity

I READ with interest the article on high resistance joints in conduit installations, by "Megohm," and agree with all that he says, but—and this in my opinion is a most important but—not enough attention was paid to coupling conduits to boxes and fuseboards.

Far too many electricians when connecting a conduit to a box or fuseboard, do so by screwing a male bush into a socketed ended conduit and tighten with a pair of pliers or pipe grips. Now apart from damaging the bush, and creating a potential danger for the v.i.r., they have not achieved continuity.

It should be pointed out that the box or fuseboard should first be cleaned with a flat file, the coupling should also be cleaned and squared with the file, the male bush inserted, screwed in, and tightened with a spanner. In this way you get two bright surfaces clamped together. In the case of the female bush, it should be screwed home with the fingers, and the backnut locked down with a spanner, again on to a bright surface.

It takes only a minute to run the paintbrush over the exposed filed parts, when completed, and no fear of high resistance joints.

L. C. Parncutt

CROYDON

Notes on Wiring
by MEGOHM

Under Floor Duct Systems

Metallic versus Non-Metallic

UNDER floor duct systems are a good way of providing reasonable floor coverage for the distribution of electrical energy to outlet points. The duct systems are made in metal and non-metallic materials in rectangular and semi-cylindrical sections respectively.

The metallic ducts are formed from solid drawn steel conduits and manufactured in three sizes :

Height	*Base*	*Area*
1⅛ in.	x 2⅛ in.	= 2 sq in.
1½ in.	x 2⅛ in.	= 2¾ ,, ,,
1½ in.	x 2½ in.	= 3¼ ,, ,,

The non-metallic ducts are semi-cylindrical and made from fibrous material impregnated with bituminous compound, in the following sizes :

Height	*Base*	*Area*
1 in.	x 4 in.	2 sq in.
1¾ in.	x 3½ in.	3½ ,, ,,
2¼ in.	x 4½ in.	6 ,, ,,

The design of the duct layout is obviously very important, to ensure, as far as possible, complete flexibility. To cover the floor area properly they should be spaced, preferably at 5 ft intervals, in one direction, but in any case not more than 8 ft intervals, and in the opposite direction at 25 ft to 30 ft intervals. An alternative layout is the laying of the ducts adjacent to the exterior walls of the building and interconnected at intervals to a duct running through the entire length of central corridors in the building. A combination of both systems is at times used with advantage.

Twin-ducts Usual

It is usual to install a twin-duct system, one being reserved for lighting and socket outlet circuits and the second for telecommunication services. A third duct when required can be installed to meet special requirements.

In metallic duct systems, pre-formed outlets at given centres are arranged in the top of the ducts, to which can be attached pedestal units carrying socket outlets or desired accessories. In non-metallic duct systems special provision for outlet points is not necessary, since the duct can be tapped at any position on the run between intersector boxes and the pedestal screwed into position.

Bonding and Earthing

The bonding and earthing of metallic duct sections and intersector boxes is carried out by steel wedges driven in between the walls of the ducts at connection points and the complete installation bonded at convenient points to the main earth conductor for the installation.

The bonding and earthing on non-metallic duct systems of the metal intersector boxes and earth terminal of socket outlets and non-carrying current metal-work is effected by installing within the duct an earth continuity conductor, which is usually of 7/·029 cross section, but could, in my opinion, preferably be increased to 7/·044 cross section for electrical and mechanical strength.

The minimum depth of the floor fill to cover ducts and intersector boxes should not be less than 2¼ in. for metal ducts where pre-cast recesses have been formed to receive the intersector boxes, and 3 in. depth for non-metallic ducts where it is not necessary to arrange for pre-cast recesses for the intersector boxes.

Close co-operation with the architect and builder is essential to ensure the safe and efficient installation of under floor duct systems, since it is necessary that a reasonably well finished smooth and clear floor area of the order of 3,000 sq ft is made available at intervals during constructional work to enable the ducts to be properly set out and laid. It is equally important that as soon as the ducts are laid the constructional floor fill should be applied to protect from mechanical damage.

The principal characteristics of each system may be briefly summarised as follows: Metallic ducts provide strength and screening in respect to telecommunication and television service cables, while for non-metallic ducts condensation troubles are eliminated and the duct run after installation can more easily be tapped at any point on the run and an outlet point fitted.

ELECTRIC DOMESTIC HEATING and *Coal Conservation*

A Critical Appraisal

—by O. W. HUMPHREYS, B.Sc., F.Inst.P., M.I.E.E.
Director, Research Laboratories of
The General Electric Co., Ltd.

THE crisis our country is now facing demands prompt action. Prompt action means planned action. Planning on a national scale demands men of great ability, wide experience and wise judgment : it also demands data both adequate and reliable.

Right at the heart of our present problems is coal: how to get more of it, how to use what we have with maximum economy, so that the margin for export may be increased. Domestic heating rightly comes under critical review.

A complex subject, physiology intermingling with physics and science with empiricism, it is apparently but poorly understood by many ready to advise. The effect of climate on the choice of heating system; of climate and system jointly on the air temperature required for comfort, and of this temperature on fuel consumption, all tend to be ignored. Heating appliances are compared solely on the basis of the efficiency with which they convert the latent energy in coal to heat, and on this evidence alone electric heating is condemned.

Dr. F. E. Simon is a true crusader. His recent article in the ELECTRICAL TIMES [8] is a challenge which must be accepted, for if it is not the planners may well be misled. If I succeed in showing—as I shall—that the heating of our homes by electricity, far from wasting coal conserves it, I do not thereby advocate a wide expansion of electric heating. Coal conservation, though of great importance, is but one factor in determining the choice between electricity and solid fuels. When all are carefully weighed it becomes clear that each fuel has its proper function to perform and, perhaps surprisingly, that there is little conflict between the interests of consumer, electricity producer, and the nation. Spurred by friendly competition, the designers of electrical and solid fuel equipment can each contribute greatly to the common weal.

Comfort Conditions

The body loses heat by convection to the surrounding air and by radiation to surrounding surfaces. The purpose of space heating is to ensure that the surface temperature of the body at which a balance is struck between the sum of these two losses and the heat generated within the body, is compatible with comfort. The upper of the three broken curves in Fig. 1, due to Bedford, shows the combinations of wall and air temperatures which offer comfortable conditions in a room heated entirely by convection. With radiant heating, lower air and

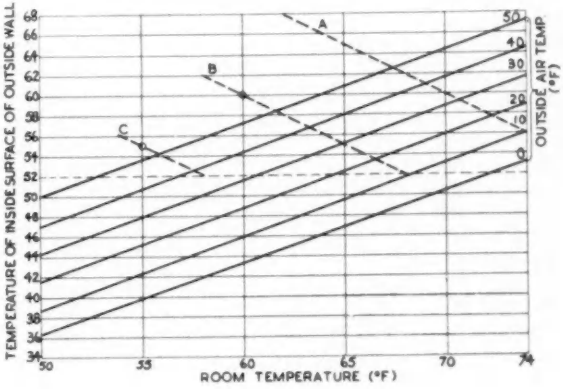


Fig. 1. Combinations of wall and air temperatures offering similar comfort conditions with different outside temperatures and different intensities of radiation. The 52° F line—shown chain dotted—indicates the minimum wall temperature for comfort. Line A refers to conditions with no radiation, B to 30 B.Th.U./sq ft/hr and C to 75 B.ThU./sq ft/hr mean horizontal component of radiation.

These curves apply to a room 16 ft x 12 ft x 8 ft 6 in. The thermal transmittance of the wall (U) is 0·41 B.Th.U./sq ft/hr/°F.

wall temperatures may offer equal comfort. Two points determined by Fishenden and Willgress and quoted by Bedford, using different intensities of radiation, are also shown in Fig. 1.[13, 14, 15] Lines have been drawn through these points parallel to the "convection only" curve. Comfort cannot be achieved with a wall temperature below about 51° F. to 52° F., and this limits the conditions under which radiant heating can be usefully employed.

In practice, wall temperature is determined by the difference between indoor and outdoor air temperatures and by the structure of the building.[1] The full lines on Fig. 1 show this relation for a house having 9 in. brick walls (transmittance 0·41 B.Th.U./sq ft/hr/° F.).

The points of intersection between the full and broken lines in Fig. 1 indicate combinations of air and wall temperatures which, in appropriate circumstances, will provide equal comfort. It will be seen that over the range of climatic conditions and radiant heating contributions to which the curves refer, the air temperature necessary for comfort varies from 57·5° F. to 75·5° F.

The figure also shows quite clearly that in countries where mean winter temperatures are very low, convection heating is used not from preference, but from necessity.

Heat Requirements

In determining the quantity of fuel which has to be consumed to maintain a room at a given temperature, allowance must be made for any heat which has to be supplied when the room is not in use, as well as for that used to maintain the temperature during the period of occupation.

An electric fire gives its full output of heat immediately and is normally only switched on while a room is actually occupied.

An open coal fire must be allowed time to "burn up," and some fuel is inevitably left on it to be consumed after the room has been vacated. An addition of (say) two hours must be made to the period of occupation to cover these requirements.

An open coal fire, an openable stove, or a closed stove, alight continuously, is banked, or the draught may be reduced, when not in use. To allow for the time taken to draw up the fire prior to occupation and for it to die down subsequently, an addition of one hour would probably suffice. During the remainder of the 24 hours the fuel consumption can clearly not be less than that corresponding to the minimum rate of burning necessary to keep the fire alight.

With all solid fuel appliances a further allowance must be made to cover the inevitable excess consumption, during both the occupation and the stand-by periods, arising from the impossibility of controlling the rate of burning precisely. Barker[12] quotes a figure of 25%; 10% has been taken for the present purpose; it will certainly not bias the conclusions in favour of electric heating.

The rate of ventilation with an electric fire seldom exceeds two air changes per hour; with an open coal fire (or an openable stove when open) it is at least five changes per hour; with a closed stove it will be lower, say three changes an hour.

To convert heat requirements into coal consumption, allowance must be made for two efficiency factors: the efficiency of the appliance itself, and the efficiency of production (in terms of heat in the original coal) of the fuel it consumes. The values of these efficiencies for the appliances under consideration are given in Table 1; they demand some comment.

TABLE I.—APPLIANCE AND FUEL PRODUCTION EFFICIENCIES

Type of Appliance	Appliance Efficiency	Production Efficiency	Overall Efficiency
	%	%	%
Electric fire ...	100	20-24	20-24
Open coal fire ...	15-25[7]	100	15-25
Openable stove (burning coal)	30-40[5]	100	30-40
Closed stove (burning coke)	55-70[7]	73[9]	40-50

During the year ending March 31, 1951, the average thermal efficiency of electricity sent out by the B.E.A. was 21·54%[10]; a weighted correction for distribution losses gives an average efficiency at consumers' terminals of 20%. The generating efficiency of the most modern power stations is given by Dr. Simon as 30%.[8] The average efficiency will rise rapidly as more modern plant becomes available and the older plant is taken out of service. It should not be many years before the efficiency at consumers' terminals averages 24%.

The upper limit of 25% given for the appliance efficiency of the open coal fire applies to the controlled draught fires developed since the war. Comparatively few are yet in use: the number is growing rapidly, but fires with efficiencies of 15% to 20% are vastly more numerous.

The production efficiency of coke is shown as 73%. The allocation of losses in the carbonisation of coal between gas and coke will long be debated, but while all the gas and coke made are in demand for use as fuels, it must surely be equitable to divide the losses equally between them.

TABLE 2.—DATA FOR THE FULL COMPARISON OF VARIOUS MEANS OF DOMESTIC HEATING

Appliance	Air Room Temperature	Radiation B.Th.U/sq ft/hr	Overall Efficiency %	Air Changes per hour	End Corrections to Occupation Period, hours	Minimum Fuel Consumption, lbs/hr	Allowance for Excess Heating %
Electric fire	61·5	40 [2 3]	20-24	2	—	—	—
Open coal fire (lit daily)	57	80 [4]	15-20	5	2 [4]	—	10 [12]
Open coal fire (alight continuously) ...	57	80 [4]	25	5*	1	1·0 [11]	10 [12]
Openable stove (alight continuously) ...	61·5	40 [5 6]	30-40	5*	1	1·0 [11]	10 [12]
Closed stove (alight continuously burning coke)	69	—	40-50	3	—	0·75 [11]	10 [12]

* During period of occupation of room

This article is concerned with fuel economy, not with the extent to which closed stoves would be acceptable in British homes. It is clear, however, that in present circumstances a sufficient number of stoves to affect the picture could not be installed in a shorter period than will be required to raise the efficiency of electricity generation and distribution to 24%.

Radiant Heat

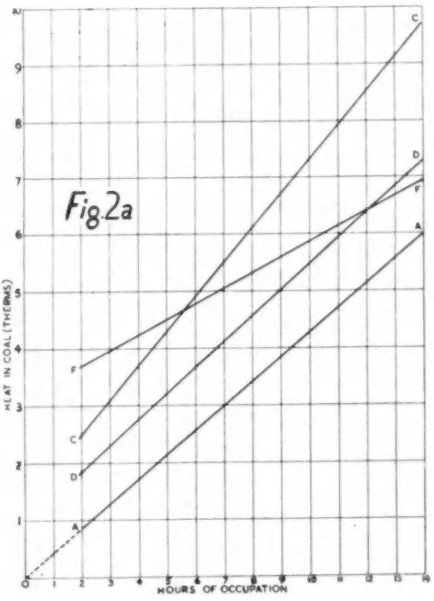
The heat output from closed stoves, especially the types having high efficiencies, is almost entirely by convection.

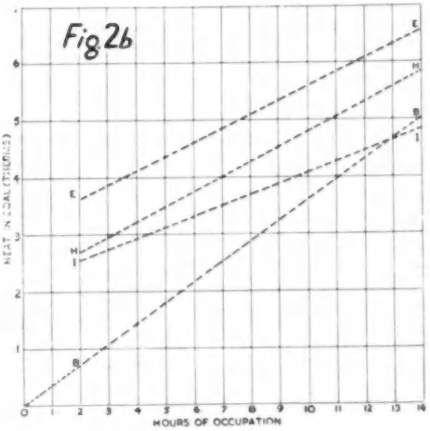
Electric fires dissipate upwards of 50% of their output by radiation. The intensity of radiation falling on a person sitting at a distance of five to six feet from such a fire varies considerably but is about 40 B.Th.U./sq ft/hr [2 3] for an average reflector fire giving a reasonably dispersed beam. At a similar distance from a coal fire burning well, the intensity of radiation may well be twice as great. An openable coal stove, having a smaller radiating area than the open fire, is more nearly comparable with the electric fire.

Coal Consumption

The data required for the final calculations are summarised in Table 2 and the comparisons

Fig 2(a) on the left show heating curves for appliances now in common use, while the curves in Fig. 2(b), below, relate to appliances in other categories. A, Electric fire, 20% overall efficiency, B, electric fire, 24% overall efficiency, C, open coal fire (lit daily), 15% eff., D, open coal fire (lit daily), 20% eff., E, open coal fire (alight continuously), 25% eff., F, openable stove (alight continuously), 30% eff., H, closed coke stove (alight continuously), 40% eff., I, closed coke stove (alight continuously), 50% eff.





themselves are presented graphically in Fig. 2, which shows the total heat content of the coal burned by, or on behalf of, the various appliances to maintain comfort conditions during various periods of occupation. The comparison applies to a room 16 ft by 12 ft by 8 ft 6 in. having 9 in. brick outside walls and a normal proportion of window area, and to an outdoor temperature of 40° F, this being about the mean temperature for the heating season in this country. In the case of appliances which consume fuel outside the period of occupation, consumption has been determined by adding the fuel consumed during the banking period to that used during the occupation period and dividing by the number of hours of occupation.

The full lines refer to appliances in common use today: the broken lines to appliances which could not be brought into use, or to efficiencies unlikely to be achieved, for some years.

Conclusions

The curves merit careful study. Electricity, at present generating and distribution efficiencies, shows a marked saving in coal consumption when compared with open coal fires (including the latest types) and openable stoves. It also compares very favourably with closed coke stoves (not at present used to any extent in this country) for periods of occupation of less than from 9 to 13 hours, according to the stove efficiency. At generating efficiencies to be expected within a few years, electricity will compare favourably with coke stoves under all conditions, the saving in coal consumption for periods of occupation up to six hours being upwards of 30%.

Domestic electric heating does not waste coal—it conserves it.

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NEW LITERATURE

The Blue Book, 1952

ALMOST back to its pre-war size is this hardy annual which is familiar to all as the most comprehensive directory of the British electrical and allied industries. There has been only slight modification in the presentation from last year's volume, but this, the 70th edition, is revised throughout and certain sections have been extended, adding considerably to its value. The various sections covering the activities of every branch of the industry and associated professional and trading organisations are now arranged in what should prove to be a more convenient order. In the Classified Section, with the introduction of new headings the number of entries has swelled, and many more names have been added to the trade names section—a feature which many will frequently use. This up-to-date edition will slip readily into its niche among reference works. Published by Benn Brothers Ltd., 1,338 pages, 9½ in. by 6 in. Price £2 10s.

BOOKS RECEIVED

Introduction to Electronic Circuits, by R. Feinberg. Textbook for university engineering undergraduates attending an introductory course in electronics. Published by Longmans Green, 163 pages, 8½ in. x 5½ in. Price 18s.

The Application of Plastic Theory to the Design of Mild Steel Beams and Rigid Frames, by F. A. Partridge. Issued as Technical Brochure No. 3, by The British Constructional Steelwork Association, Artillery House, Artillery Row, London S.W.1.

Structural Adhesives. Lectures given at a Summer School on the technology of synthetic resin adhesives, held at Cambridge in 1951. Published by Lange, Maxwell and Springer, 41 Neal Street, London W.C.2, 203 pages, 10 in. x 8 in. Price 21s.

Larger Units for the Grid

I.E.E. Paper Suggests 100 MW Unit Arrangement as the Optimum

THE application of statistical analysis to engineering problems has long been known in connection with quality control; it is, however, unusual to find this powerful argument being applied to the broad question of boiler-turbine groupings and sizes on a large interconnected network. A paper, "Economic Plant Sizes and Boiler Set Groupings on the British Grid," by BRYAN DONKIN and P. H. MARGEN, presented to the Supply Section of the I.E.E. on Wednesday last, however, used statistical methods to derive its conclusion.

Cost and Size

The paper began by stating that the capital cost of generating stations could be divided into three components which were, respectively, functions of the unit sizes of the boilers, of the unit sizes of the turbo-alternators, and of the capacity of the station.

An increase in unit size reduced the cost per kW of the first two of these components, but these reductions tended to diminish when the sizes became relatively large for the given design. At some size a different design usually became more economic; for instance, p.f. firing as opposed to stoker firing for large boilers; or 1,500 r.p.m. machines, instead of 3,000 r.p.m. units for the largest sizes. It was, however, possible from published data to derive curves showing relationship between cost/kW and size of unit, although the actual relations were somewhat uncertain due to operating and other variable conditions. Again it was important in deriving such curves to take into consideration that many sets would at some time have to go on two-shift duty.

Annual costs affected directly by the set size for given steam conditions were capital charges, running and maintenance costs and a small proportion of the fuel costs. For the purpose of calculation these costs had been taken as 10% of the capital outlay.

Reserve Capacity

A margin of reserve capacity in the system was required to provide for deviation in demand and for outage capacity. With a given security margin some supply curtailments might occur, and the probability of this was known as the "risk" and was defined as the ratio of the average number of kWh lost owing to supply curtailments over a given time interval, to the average number of kWh required during this interval.

To determine the required security margin of reserve capacity for a particular risk on an interconnected system, it was necessary to examine the combined effect of chance fluctuations in load and chance variation in forced outage capacity. With a large system having many units connected to it (such as the Grid) the deviations in forced outage capacity were small and had a negligible influence on the security margin required; where, however, an individual load centre was fed by, say, eight plants of equal capacity the chance deviations in forced outage capacity were larger than that of the load, with the result that the individual load centre needed a much greater security margin than the Grid as a whole. In the overall case, this security was provided by interconnection.

Curves were given in the paper showing the required security margin needed for several different risks and different numbers of plant units assuming a one-boiler per turbine grouping without steam cross-connections. It was possible to obtain by statistical analysis the saving in reserve generation capacity effected by the interconnection of load centres and also derive the minimum capacity of the interconnectors entering the load centre to achieve the full saving in reserve generation capacity.

Optimum Plant Sizes

Having derived the capacity of the interconnectors, and the reserve generating capacity required, the economic plant size could then be considered. This could be obtained by summing all the relevant costs of generation, differentiating with respect to plant size and equating to zero. By adopting different arrangements of plant layout a series of curves could be obtained to take into consideration the additional security due to interconnection and thus derive the optimum machine size.

The restrictions in siting and comparative isolation of various stations from a load area, together with selected use of stations according to their efficiency, had a tendency to increase the optimum size of units. From the available data, however, it might be concluded that turbo-alternators designed for the Grid in the

next few years, would, in nearly all cases, be of 100 MW or over if one boiler was associated with one turbo-alternator and 130 MW or more with two boilers per turbo-alternator. In fact, as conservative estimates of cost/size relations had been taken the actual figures might prove to be larger.

In order to cope with overhauls it was calculated that the most economic and convenient system was to provide a complete steam tie bar along the boilers and to run normally on the "unit" system. The provision of a spare boiler was shown to be economically inferior.

DISCUSSION

MR. J. D. PEATTIE (B.E.A.) said that the value of the paper lay not so much in the detailed calculations as in the line of thought which it suggested to those who had to make decisions. The distinction between normal conditions and emergency conditions was implicit in the authors' arguments, but, having lived through two world wars, two rearmament periods and a succession of peace-time crises, he wondered what he was to understand by "normal conditions." Availability played the major part in the decision to instal very large unit-type plant, and until more precise data were available about the physical features which lay behind availability, particularly in the case of boilers, it was difficult to make accurate economic calculations.

MR. H. V. PUGH (London Division) welcomed the recommendation that even plant of the size which the authors proposed should be designed to operate on a two-shift basis. They had experience today of plant which had been in service for perhaps 16 years and which was now having to operate on a two-shift basis, and they were getting all sorts of troubles which never occurred when the plant was on base load.

He thought that the general opinion in the industry today would be against taking turbo-alternators out for overhaul every second year. Large turbo-alternators could be given a thorough overhaul every third year, carrying out the work in four to six weeks.

MR. W. F. SIMONSON (Water-Tube Boiler Makers' Association) said that past experience of pulverised-fuel firing in boilers of progressively increasing unit capacity gave good ground for confidence that the availability of a boiler of 830,000 lb./hr would match its 100 MW turbine counterpart, but he hesitated to accept the suggestion that such units should at some stage in their service life be relegated to shift duty. Experience had been gained in the U.S.A. with the quick-starting of large turbo-alternator sets, but not with a stop-valve temperature as high as 1,050° F.

Variations in fuel quality might seriously modify some of the authors' conclusions and limit, at any rate in the immediate future, the practical applicability of the 100 MW unit in this country. It would also prevent the acceptance as a general conclusion that standby boiler capacity could be dispensed with.

When generating plant in the older stations fell due for replacement, if the new plant was designed for peak-load operation, omitting all unessential refinements, the cost differential in comparison with large-unit stations might disappear. A contributing factor would be a measure of standardisation in regard to boilers, turbines and the principal station auxiliaries. In that case a continuation of present B.E.A. policy would be economically justifiable.

MR. C. E. H. VERITY (B.E.A.) said that plant extension programmes were dealt with nowadays to cover a period of three years, namely the fifth, sixth and seventh years ahead. Whilst experience showed that the factors involved had to be dealt with individually in respect of each programme, the trend was in the direction of the use of larger individual plant capacities and the increasing adoption of the unit system.

DR. R. J. ELDRED (Merz & McLellan) emphasised that complete unitisation would involve very considerable duplication, and perhaps triplication, of important auxiliaries, to maintain availability, but the amount of standby auxiliary plant could be reduced by interconnection.

PROFESSOR R. O. KAPP (Kennedy & Donkin) observed that statistical formulae provided the only reliable basis for a decision when the individual occurrences were both very variable and each singly unpredictable. Examples of this were the ages at which people died and the occasions when turbo-alternators developed defects. In dealing with the former, insurance companies used statistics, but in power-station design in the past "hunches" had been employed. The sensible thing to do was to put as many considerations as possible into a formula, so that one's mind was left free to deal with the others, which must be matters of judgment. Consideration should be given to the fact that 30 and 60 MW sets had been standardised and could be built more quickly. It meant that an immediate start should be made on developing and standardising larger sets.

MR. A. W. PEDDER (Merz & McLellan), while agreeing, for different reasons, that 100 MW sets were right, did not feel that anything had been proved by the authors' method of approach, which he subjected to some detailed criticism.

MR. I. D. CAMPBELL (National Coal Board) described it as an "old English custom" first to decide on what one was going to do and then to find a statistical reason for doing it. He suggested that where there were collieries which could supply a small quantity of a certain fuel continuously there was a case for the small station.

MR. J. A. B. KING suggested that on shift operation there was no need to shut down the plant overnight; troubles in the turbine might be avoided by leaving it ticking over at a very slow speed with steam trickling through.

DR. F. ROGERS and MR. C. F. FLURSCHEIM also took part in the discussion, to which Mr. P. H. MARGEN replied.

Where are Wiremen needed?

Minister of Labour speaks at E.C.A. Dinner

Stanley Watkins, President of E.C.A., addresses the members and guests at the annual dinner. Sir Walter Monckton and Sir John Hacking are seated on his right and left respectively

PRINCIPAL guest at this year's annual dinner of the Electrical Contractors' Association, held on Tuesday of last week, was SIR WALTER MONCKTON, K.C.M.G., K.C.V.O., K.C., M.C., M.P., the Minister of Labour and National Service. In proposing the toast of the Allied Associations (E.C.A., N.E.C.T.A., N.F.E.A.), Sir Walter took the opportunity of speaking of the new Notification of Vacancies Order. After mentioning the speech made that afternoon by the Chancellor of the Exchequer, the Minister said that the real answer to the country's problem was greater productivity: the phrase was familiar, but it was still true.

From his own Ministry's point of view, the task to be performed was the persuading of people to go to work where they were needed. Persuasion was the keynote; labour exchanges were human agencies, and their job was to find the best place for workers without compulsion. Older people would be free of restrictions, to encourage them to take up some work.

Another necessary step was attention to the training of people in the various industrial skills. All sides of industry should consider what could be done to extend the age of apprenticeship; industries were to be approached one by one on this matter.

MR. STANLEY N. WATKINS, President of the E.C.A., who replied to the toast, affirmed the Association's readiness to support any constructive efforts initiated by the Government. In particular, he pledged full co-operation in the labour field. Referring to the engagement order, however, he urged the Minister to avoid overestimating the requirements of factories for electricians. During the last war, he alleged, there were sometimes five electricians employed where considerations of efficiency and economy justified only one.

Material Shortages

Turning to material shortages, he referred to the task accepted by the Director of the E.C.A. of allocating the supplies available to the contracting industry. The position about steel was made more difficult by the insistence of many bodies, including government departments and local authorities, on specifying steel conduit for situations in which other systems could be safely employed. Action was needed here, and also to stop the waste of scarce metals in the production of shoddy appliances.

An important factor in productivity was the length of the working week. It had been the experience of the contracting industry, as of many others, that the promise of equal or even greater output during a 40- or 44-hour week had proved to be a myth. The weekly output had only been maintained at its present standard by the operation of a working week averaging 50 to 54 hours. Everyone, from top

In this group, taken before dinner, are seen Mr. P. V. Hunter, Mr. L. C. Penwill, Sir John Hacking and Mr. W. K. Brasher

executive to the youth from school, should at the present time be prepared to work longer hours for the normal rate of pay.

The next toast on the list was that of the Guests and this was most wittily proposed by MR. A. F. PLUMMER, M.C., ASSOC.I.E.E., a Vice-President of the E.C.A. The first of the two speakers responding was SIR JOHN HACKING, who spoke as President of the I.E.E. Sir John dealt particularly with the close co-operation between the I.E.E. and the E.C.A., especially in the matter of wiring regulations, recalling that by the time of the fifth edition of this code in 1907 there was strong representation of the E.C.A. on the responsible committee. The wide importance of the rules was confirmed by the fact that the present, 12th, edition had so far sold 47,000 copies. Work was about to start on the 13th edition, and comments on possible changes would be welcome.

Up to a few years ago there had been co-operation between Institution and Association on the National Register of Contractors. It was a matter of regret to the I.E.E. that such co-operation had to be stopped due to a difference in view about compulsion. Now there seemed to be a similar snag arising concerning the National Inspection Council. The E.C.A. were in the best position to judge the risks and advantages of compulsory registration, but they should beware lest they were being led astray by the idea, which seemed to him contrary to the British way of life.

The other response to the toast came from MR. E. C. HOLROYDE, COMP.I.E.E., Chairman of the C.M.A., who was confident that the troubles at present facing his industry would be overcome. A toast to the President, proposed by MR. W. A. GAZARD, A.M.I.E.E., to which Mr. Watkins modestly replied, concluded an enjoyable evening's formalities.

The Swiss and Electricity

LITTLE time could have been wasted in the gathering of information on electrical conditions in Switzerland which preceded the seventh Caroline Haslett Trust lecture delivered at the I.E.E. last week by Miss Kathleen E. Piatt, housecraft advisor in the Chester sub-area of Merseyside and N. Wales Electricity Board. Title of the lecture was "Ideas from Switzerland: Electricity in the Home," and the survey given indicated a comprehensive tour of that country.

In the course of her tour Miss Piatt visited Zurich, Berne, Geneva and Lausanne, and probably the most outstanding discovery was not so much the prevalence of electricity and gas as the absence of an alternative, particularly among the peasants. The advent of electricity converted the one great natural resource, water power, and today hydro-electric plant provides about a quarter of the total kilowatt hours required by the Swiss.

Electricity supply forms part of the local government service in most of the main towns and cities and rural areas are covered by the Canton service. Great attention is paid by showroom staffs to demonstrations of various kinds. Cooking demonstrations are particularly popular, and always well attended. Their popularity is even greater in rural districts where the demonstrator's occasional visit is an important event. The overall conclusion must be that there is a very real demand for cookers. In the whole country approximately one-third of households cook by electricity. Laundry demonstrations are gaining in popularity, but the traditional Swiss washday (once a month) in which old, primitive and laborious methods are used, is not conducive to the employment of the modern washing machine. It is probably a relic of war years when they became subject to a heating ban, but electric fires are not popular as it is felt they are an unreliable source of heating.

Still on the subject of domestic appliances and accessories, strict tests are carried out on all equipment to ensure high quality. Manufacturers send new appliances to the Association of Swiss Electricians for testing and, if approved, the letters ASEV are included in the design of the mould. In a slightly different vein, outdoor lighting is of a high standard, but in the home is very much below average. A campaign is now afoot to rectify the latter situation and a start is being made by recommending better lighting for the kitchen.

Finally, as regards tariffs, the Swiss have nearly a thousand, but standard rates for the whole country are now under consideration.

Problems and Practice

IN ENGINEERING

Current Transformer S.C. Links

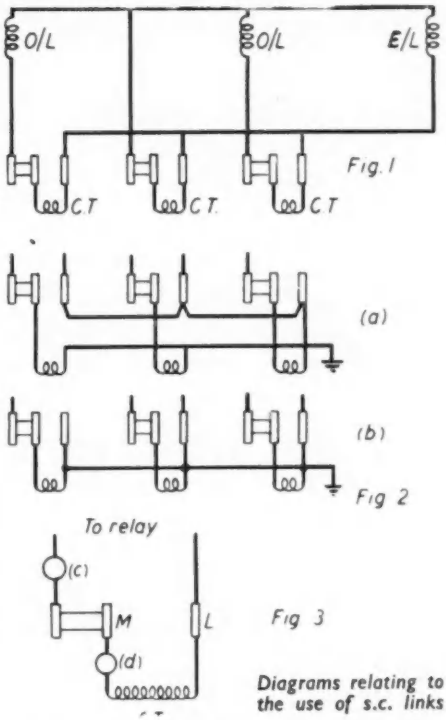
TEST blocks with short-circuiting links are normally provided for meter circuits, while test blocks with links are sometimes provided for protective gear circuits. In both cases, two links are necessary so that the c.t. is not open-circuited during the process of short-circuiting. There are advantages and disadvantages if such links are provided in protective gear circuits, and the object of this note is to state all of the conditions involved, some of which are not readily apparent.

Their uses may be summarised as follows: (1) It is possible to insert a meter between the two l.h. links (see Fig. 1) and then remove the bars, so inserting the meter without breaking the circuit. (2) The terminal blocks for the s.c. links may be used for test current injection. (3) The terminal blocks give easy access to the c.t.s to test for characteristics or continuity. (4) On metering c.t.s we can short-circuit the c.t. and make any alterations with the minimum of disconnection. (5) The links are on the front of the panel and so avoid dealing with crowded connections at the back of the panel.

In the case of an overload and earth leakage circuit, mal-operation of the e/l element will occur if the links are disturbed on load—the only time that they ever will be moved. If one c.t. is short-circuited, this will disturb the balance of the currents and the e/l element will operate and trip the circuit breaker. It is, therefore, essential to remove the trip link or wedge the e/l contacts before using any s.c. links. Warning notices should be provided in the s.c. link boxes to this effect.

It is possible to arrange the c.t. connections in two ways as shown in Fig. 2. Method A uses fewer pilots, but method B gives a smaller burden on the c.t.s. B is the standard method.

There are two possible positions for an ammeter in such a circuit as shown in Fig. 3. In position c the c.t. may be short-circuited without disadvantage, but if relay test current is injected at the s.c. block this current will pass through the ammeter and damage it, especially if the ammeter is not on the same panel as the relay so that it is not visible to the tester. In position d the ammeter is not affected by relay test currents injected at the test block. However, if it is necessary to change the ammeter, the wireman would s.c. the c.t. at the block and then remove the ammeter so leaving the c.t. open-circuited. The ammeter would be indicating a load current, however, so providing some indication of the condition.



Diagrams relating to the use of s.c. links

An easily accessible test link should be provided in the earth lead of the c.t.s so that the system may be disconnected from earth whilst the insulation resistance is measured.

As a general recommendation, under no circumstances should any instrument be inserted between the c.t. secondary and the test block. Also c.t. leads should always be taken to the lower side of the block.—*I.G.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Progress in Production during 1951

BABCOCK & WILCOX LTD.

THE increased output of Babcock and Wilcox in 1951, together with the outstanding efforts of the Company's erecting and service departments, has resulted in a larger number of boilers being commissioned—particularly for the B.E.A.—than in any previous year. By the end of the year, the evaporative capacity of Babcock boilers commissioned or on the eve of commissioning, aggregated some 11,000,000 lb/hr in Britain alone. Amongst these and the large volume of overseas orders are a number of units possessing special interest.

B.E.A.

Babcock boilers commissioned this year for the British Electricity Authority totalled some 7,000,000 lb/hr evaporative capacity. They included the first two of six 360,000 lb/hr units for North Tees, two of the six 300,000 lb/hr units for Braehead and two further 365,000 lb/hr units for Cliff Quay. Bromborough (4 x 300,000 lb/hr) Blackwall Point (2 x 360,000 lb/hr), Peterborough (3 x 160,000), Rye House (2 x 350,000), Staythorpe (3 x 240,000), Walsall (1 x 180,000) and Westwood (Wigan) (2 x 300,000) were other stations where new boilers were commissioned, and it may be fairly claimed that Babcock and Wilcox contributed well over one-half of the boiler capacity behind the B.E.A.'s record increase of 1113MW during the year.

Latin America

Orders received from Latin America — notably Brazil—during 1951 include a large number of the smaller industrial units.

Boilers commissioned or under erection include a number for the Argentine Ministry of Marine, and a unit for Sao Jeronymo, Brazil, with a capacity of 77,200 lb/hr arranged for alternative coal or oil firing.

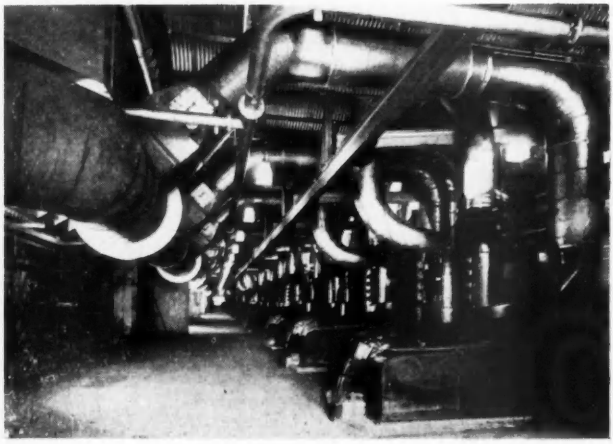
Largest installation of all was that of the Cia Italo Argentina de Electricidad for their power station at Puerto Nuevo, comprising four Integral-Furnace boilers each rated at 240,000 lb/hr, at 425 lb/sq in., 850° F.

Another installation, commissioned at the station of the Cia Americana de Luzy Traccion, Paraguay, consists of two boilers of 33,000 lb/hr at 285 lb/sq in., 765° F. Though of comparatively small capacity these are of outstanding interest in that they have special furnaces for firing with wood logs up to 18 in. diameter, and are equipped with hydraulically operated firedoors.

Dominions

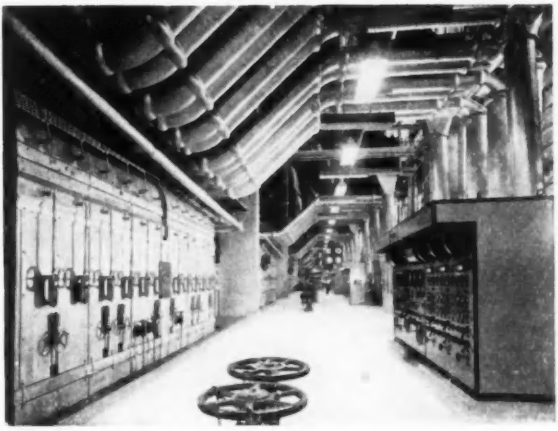
Probably the most outstanding installation completed in 1951 was that for the Government of India's new artificial fertiliser factory at Sindri, which, with its designed output of 1,000 tons of fertiliser per day, is of primary importance in meeting India's major food problems. The steam-raising plant comprises six Tridrum boilers of 175,000 lb/hr at 650 lb/sq in. 835° F, fired by Babcock-Detroit Rotograte spreader stokers with grit refiring, to burn fuel of exceedingly poor quality. This is the largest single industrial boiler installation in the sub-continent.

In Australia, at Osborne "B" power station,



Type E pulverising mills are installed at Cliff Quay

The firing aisle at Cliff Quay presents a neat orderly array of control gear



a Bidrum boiler of 180,000 lb/hr with spreader stokers has been steamed. Orders received include 12 boilers for Lake Macquarie, six being High Head and six Bidrum type, with capacities of 240,000 lb/hr. Six boilers are already under construction.

The Electricity Supply Commission of South Africa have placed with Babcock and Wilcox of Africa (Pty.) Ltd., orders for six Radiant boilers of 580,000 lb/hr with pulverised fuel firing, for Taaibos power station. These will be the largest boilers in South Africa.

Home Industrial

Orders were received during the year from industries as widely diverse as oil refineries and bacon curing, including light and heavy engineering, several branches of the chemical industry, rubber, sugar refining, timber, gasworks, steelworks and the plastics industry, and covered a 100-1 range of steaming capacities, the smallest unit being 4,000 lb/hr and the largest 400,000 lb/hr. This latter boiler, is for Ford Motor Co. Ltd., Dagenham. Of Radiant design, it will operate at 1,250 lb/sq in., 940° F and will be the largest industrial boiler in Europe. Fired by pulverised fuel it has auxiliary burners for blast furnace gas to enable it to deliver limited quantities of steam at week-ends and similar periods of light load.

Interesting special units for I.C.I. Wilton are two heat exchangers recently put into service for providing an extraordinarily high degree of superheat for low pressure steam, the working temperature being 1,700° F, stated to be the highest industrial steam temperature in the world at the present moment.

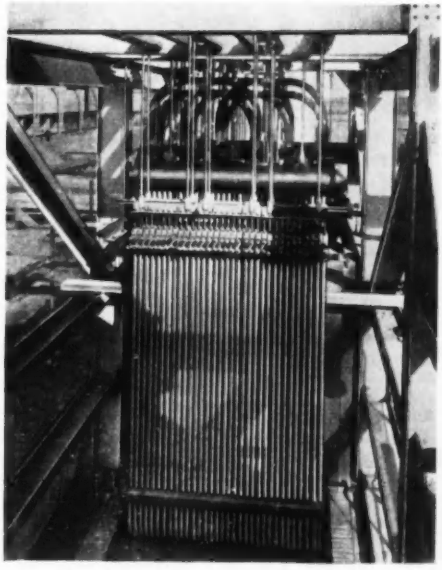
Mechanical Handling

A wide variety of mechanical handling equipment manufactured and installed during the year, included "Hydrojet" and "Hydrovac" high velocity ash and dust handling plants, for Dunston, North Tees (600 tons/day), Bromborough, Blackwall Point, Poole, Westwood (Wigan) and Peterborough power stations, and some of the larger industrial plants such as the Lostock, Wilton and Castner-Kellner organisations, operated by Imperial Chemical Industries.

Many coal and coke handling plants have been installed embracing railway wagon tipplers, storing and reclaiming equipment, crushing and screening plant, automatic skip hoists, telphers, belt conveyors, chain- and-buckle elevators and gravity bucket conveyors, the latter being arranged throughout for automatic oil gun lubrication.

Power station coaling plants include Westwood (Wigan), Peterborough (15 wagons/hr discharge rate) and Staythorpe.

This heat exchanger for superheated steam at 1,700 F has been installed at a large chemical works in this country



overseas news

Finance

Indicating that the funds provided for the current financial year would not be sufficient, Mr. Knight, Hydro-Electric Commissioner, Tasmania, has stated that the Commission had spent more than half its allocated £7,000,000 in the first six months of the year. Rapid rises in wages and cost of materials were the commission's main worries. He said that between 1949-51 the cost per man on hydro projects had risen by 45%. From 1950-51 there was an increase of 29% for each man. In the future about £5,000,000 would be needed to fulfil long-term contracts alone, he said.

The Winnipeg Referendum

Having decided that the proposed power reorganisation should be submitted to the referendum of city ratepayers (this page, January 31 issue), the Winnipeg City Council has agreed to set up an Education Committee to inform the voters on the complicated issues involved prior to voting day, which will probably be early next month. The Mayor has been empowered to appoint the special committee of aldermen who "may incur whatever expenses may in their judgment be necessary" to carry out the education programme. The programme itself includes "all things necessary to acquaint the electors with all the various matters connected with . . . power reorganisation."

Free Street Lighting

Using the argument that "street lighting serves all the citizens and it is not equitable that they should be paid for by taxpayers alone," the Toronto Hydro Commission has offered to provide free power for street lighting in that city; thus saving the local taxpayers an estimated $700,000 a year. And the Commission proposes to absorb the lighting cost without any increase in tariffs. The Commission's offer has to be approved by the Hydro Electric Power Commission of Ontario, but no difficulty is anticipated in this direction. The latter Commission supplies practically all the urban centres in Ontario, who operate their public services by Public Utility Commissions. It remains to be seen whether the lead given by the Toronto Hydro Commission is followed by other large urban areas.

More H.E. Schemes

Development of power projects along the St. John River in Eastern Canada and the United States—if undertaken—would cost about $125 million, members of the International St. John River Engineering group were told at a meeting last month. Data concerning three projects were given. These are the Rankin Rapids, in Maine, which would cost $80 million, the Morrell project (costing $19,300,000) and the Beechwood scheme (to cost $25,700,000). The Rankin project, the site of which is just above the rapids, would take three years to complete and a further year to fill up the reservoir, it was stated. The project would produce an estimated 900,000,000 kW/hr a year. Sale of the hydro-electric energy would bring revenues of about $10,350,000 a year before deductions of distribution, maintenance and other costs and depreciation on building equipment. The group decided that all three schemes and smaller ones still at early study stages would be feasible and worthwhile.

Seaway Project

Canadian and U.S. officials met last month to draft applications seeking the approval of the international joint commission for the power facilities phase of the St. Lawrence Seaway scheme. The commission is an American-Canadian body whose approval is required for any alteration of the water levels of the St. Lawrence. Last week, President Truman sent to Congress a message renewing his appeal for approval of plans for the construction, to be undertaken jointly by the U.S. and Canada, of the Seaway and Power project. It was, Mr. Truman said, in the national interest of America to take part on an equal basis with Canada in the building, management, and control of this project.

Another Station

At Porto Vesme, in Sardinia, recently, the foundation stone was laid of a new power station, which is to utilise much of the coal waste from local mines which had previously found little industrial use. The station is expected to be completed in 1954, and will have an annual output of about 280 million kWh.

Spain's Railways

According to a local report, Westinghouse Electric and Manufacturing Co., of U.S.A., is to supply the Spanish State Railways (RENFE) with equipment and technical assistance in connexion with the project for electrifying the Manzanares-Baeza-Cordoba line in Southern Spain. Westinghouse are credited with having already contracted to supply 20 electric locomotives and miscellaneous electrical equipment for use in the scheme.

Acquisition Stopped

A halt has been given to acquisition by the State Government of local authority electricity undertakings in Madras, by reason of the judgment recently given in the Madras High Court on a batch of petitions filed on behalf of nine municipalities questioning the validity of the Madras Electricity Supply Undertakings (Acquisition) Act, 1949, as it is applied to the local authorities. The petitioners were the municipalities of Madura, Coimbatore, Tanjore, Vijaywada, Masulipatam, Karur, Bodinayakanur, Tirupathi and Pollachi. Giving judgment allowing the petitions the judges held that the Act, in so far as it related to local authorities, contravened Article 14 of the Constitution and therefore was *ultra vires*. The next step appears to be with the State Government.

Local Factory

The Pakistan Minister for Communications, Sardar Bahadur Khan, last month laid the foundation stone of the Kotri telegraph factory and workshop, which is planned to produce material for the construction of overhead telegraph and telephone lines (such as telegraph poles and brackets) and to undertake repair work for the miscellaneous apparatus used in the Posts and Telegraphs Department. This factory will cost about Rs.600,000. Some 130 workmen will be employed, apart from the staff engaged in clerical and accounting work. With its establishment another step towards stabilising the services of the P. and T. Department has been taken.

Plant Wanted

Members of a sub-committee on electric power, meeting in Rangoon, have called on suppliers of electric power equipment throughout the world to improve deliveries to Asia, in the first official report of the United Nations Economic Commission for Asia and the Far East. The report called for improvements in obtaining electrical and other equipment to governments whose power plant construction needs were mounting rapidly. The committee urged member governments to place large orders for equipment at least two years in advance of actual construction and installation. It also recommended that Asian countries themselves undertake the manufacture of needed electric power equipment, and that governments take a leading part in the power industry development.

Madras Results

Good progress of electrical development in the State is recorded in the administrative report of the Madras Government Electricity Department for the year 1950/51. Total units generated amounted to 681·59 million, compared with 605·8 million in the previous year. Of that total, 510 million were generated at hydro-electric stations. The total number of consumers served by all electricity undertakings in the State, including Government ones, was 275,697. Of these, 274,033 were in the area covered by Government undertakings—110,825 served directly by the Electricity Department and 163,206 by licensees distributing power obtained in bulk from government stations.

During the year covered by the report, electricity supplies were extended to 224 villages, the licensees on their part electrifying 64 villages. As part of the 1951-52 programme, it was the intention of the Department to acquire all the remaining 28 local authority undertakings, but that plan has apparently been upset by the High Court judgment noted above.

Import Duty Inquiries

The Indian Tariff Commission has drawn up a tentative programme for the hearing of inquiries into the importation of various commodities. Early in the list is the question of batteries for motor vehicles, which will probably be dealt with at the beginning of next month. An inquiry regarding transformers is scheduled for April or May.

Load Control

In its effort to control the growth of the load, the Christchurch (N.Z.) City Council Electricity Committee has made two recommendations. These are (1) that electric water heating in new premises in future be connected only if an alternative means of water heating is provided—either by installation of an incinerator or fire-back heater, to provide hot water during future power shortages; and (2) the present method of restricting space heating in commercial and industrial premises should be continued. The committee reported that Mr. A. E. Davenport, general manager of the New Zealand State Hydro-Electric Department had earlier pointed out to representatives of South Island authorities that the Cabinet had decided the growth of load must be limited to 5% per annum until the Roxburgh station came into operation.

Cooker Imports

The New Zealand Minister of Customs has announced that electric ranges (item 353-4) may be imported without the requirement of a licence during the 1952 licensing period from non-scheduled countries, provided they are the produce or manufacture of a non-scheduled country. Previously, the item was on the deferred list. Scheduled countries include Canada, Japan, U.S.A. and Russia.

Auckland Railways

The Auckland (N.Z.) transport coordination committee's report on the effects of suburban railway electrification is not now expected to be presented to the Government before next April, it is reported, and that is the month in which the former general manager of railways, Mr. F. W. Aickin, originally expected construction work would start. But that prediction was made before the investigation committee was set up. That committee first met in November, and further hearings will take place this month, after which the information must be assimilated and a report prepared.

PERSONALITIES

IN THE INDUSTRY

From F. H. Wheeler and Co. Ltd. we hear that **Mr. A. J. K. Parker** has joined the board of that company and has been appointed managing director. Before taking up this new appointment, Mr. Parker had been associated with the companies within the E.M.I. group for 24 years, and for the past ten years was works engineer of E.M.I. Factories Ltd., Hayes, Middx. He obtained his engineering training with the Brush Electrical Engineering Co. Ltd., and at Loughborough College.

Mr. A. J. K. Parker

Distinction of being the first Scot to be elected a full member of the American Society of Agricultural Engineers has fallen to **Mr. J. C. N. Baillie,** development engineer of the North of Scotland Hydro-Electric Board. Before joining that Board Mr. Baillie was with the Clyde Valley Electrical Power Co., and also held posts with power companies in Yorkshire and Wales.

From Brookhirst Switchgear Ltd., we learn of two new appointments. The first concerns **Mr. G. P. Belsham,** who has been nominated a joint managing director of the company of which he has been a director since 1948. Mr. Belsham was, from 1929 to 1940, assistant works manager and from 1940 to 1943 works manager to the Igranic Electric Co. Ltd. He became works manager at Brookhirst Switchgear Ltd. in 1943. Mr. Belsham is also a director of Cantie Switches Ltd. The second appointment is that of **Mr. K. N. Swash,** B.SC., A.M.I.E.E., who has been nominated a director of Brookhirst, of which company he has been chief engineer since 1948. He was previously district engineer and manager in Leeds since 1936, and has spent 24 years with the company.

Mr. G. P. Belsham

Mr. K. N. Swash

Well known in electrical engineering circles, and associated with Crompton Parkinson Ltd., since 1927, **Mr. John V. Daniel,** has been elected to the board of that company. He has served as plant sales manager at Nottingham and Manchester, as general sales manager of the Plant Division, as assistant general manager of the British Electric Transformer Co. Ltd., and in 1948 was appointed to the position of deputy works director for the Southern Works of the company. Mr. Daniel has been an executive director of Crompton Parkinson Ltd. since 1946 and, in December 1949, was appointed assistant managing director (works), in that capacity assisting the joint managing directors of the company on works matters. He recently returned from a visit to Australia and New Zealand on behalf of the company.

Mr. J. V. Daniel

Mr. J. B. Mavor, a director of Mavor and Coulson, Ltd., has been re-elected president for the ensuing year of the Glasgow and West of Scotland section of the Institute of Industrial Supervisors. **Mr. T. P. Wylie,** of the same firm, was elected chairman.

Mr. W. A. Bloodworth, B.E., formerly chief designing engineer (hydro-electric) with the New Zealand Ministry of Works, has been appointed civil engineer, design and construction, to the State Electricity Commission of Victoria.

Newly appointed as manager for Spain to the Metropolitan-Vickers Electrical Co. Ltd. is **Mr. F. C. Gray,** A.M.I.Mech.E. He joined M.V. in September 1938 as a college apprentice. After war service in the Navy, he completed his apprenticeship and in 1947 joined the General Engineering Dept. as a junior engineer in the Power and General Section, but in the following year transferred to the Export Company. In 1949 he left M.V. to take up an executive position with Gilbert, Gilkes and Gordon Ltd., of Kendal, where he remained until the end of last year.

Mr. F. C. Gray

Mr. E. F. Embleton has been nominated manager of the Birmingham district office of the Hotpoint Electric Appliance Co. Ltd. in succession to **Mr. J. H. Ratcliffe**, who has resigned. Mr. Embleton has been with Hotpoint since 1922, and until 1950, when he was transferred to the Peterborough works, was attached to the head office staff in London. Mr. Ratcliffe, who leaves the company at his own request, was previously manager of the firm's district office at Nottingham.

Mr. E. F. Embleton

The sales staff of A. H. Hunt (Capacitors) Ltd. has been reorganised and, under the direction of **Mr. F. S. Richmond**, is now as follows: **Mr. R. C. W. Clarke** is responsible for all Government contracts; **Messrs. O. G. Cox** and **E. A. Benwell**, hitherto the technical sales representatives in the Electronic and Industrial Divisions, become joint sales managers; sales to service trade, wholesale and retail, are looked after by **Mr. John Moor** in the capacity of sales manager of this section as hitherto. As already announced, publicity is now entirely in the hands of **Mr. H. E. Campbell**.

Following the announcement that **Mr. Walter M. York**, Ekco publicity manager, has also become an executive director of E. K. Cole, Ltd., two new publicity appointments have been made. **Mr. John E. Furley** becomes assistant publicity manager (he has for many years held an executive position in the Ekco Publicity Department, which he joined in 1932); and **Mr. Michael K. Kaye** has been appointed Press officer. Mr. Kaye joins Ekco from the Nuffield Organisation, where he held the position of assistant p.r.o.

Mr. J. S. Pickles, J.P., B.SC., M.I.E.E., chairman of the Yorkshire Electricity Board since December last, is shortly returning, at his own request, to his former post of chairman of the South West Scotland Electricity Board. He has asked the Minister of Fuel and Power to allow him to make this change for purely personal and private reasons; there is no question of disagreement with the Board, we understand. Mr. Pickles was appointed to the Yorkshire Board after the Scarcroft trial. He had earlier been chairman of the South West Scotland Board since its formation, and, prior to nationalisation, was county electrical engineer to Dumfries from 1931.

Mr. J. S. Pickles

Mr. Hesketh handing the watch to Miss Miller

At a very successful dinner party given recently at the Trocadero, by members of the E.L.M.A. Publicity Committee, the guest of the evening was **Miss Nora E. Miller**, who recently resigned the position of manager of the publicity department of Ediswan. On behalf of the members, **Mr. R. E. Hesketh** (G.E.C.), presented Miss Miller with an inscribed wristlet watch as a mark of appreciation of her long association with the Committee. Among those present were **Mr. W. J. Jones**, director, E.L.M.A.; **Mr. H. R. Mallet** (Siemens), chairman of committee; **Mr. H. E. Goody** (B.T.H.); **Mr. F. J. Addington Hall** (Philips); **Mr. McK. E. Tatchell** (Ediswan); **Mr. E. B. Sawyer**, E.L.M.A. (L.S.B.); and **Mr. T. O. Freeth**, E.L.M.A. (L.S.B.).

At last Friday's meeting the Belfast Corporation confirmed the ballot-vote recommendation of the Electricity Committee to appoint **Mr. R. P. Watson**, B.A., B.A.I., M.I.E.E., as the new deputy city electrical engineer and general manager, at a salary of £1,505 p.a., in succession to Mr. J. McCandless who resigned last July. The council made the appointment after defeating by 39 votes to 12 an amendment to refer the recommendation back to the Electricity Committee for further consideration that the questions submitted by the chairman, Alderman W. H. Cooper, be put to the four candidates who had applied for the post.

Mr. R. P. Watson

Mr. W. J. McC. Girvan

Sir William Neill, a former Lord Mayor, speaking in favour of the appointment of Mr. Watson, said that the latter's academic qualifications were not exceeded by any other officer of the department. Mr. Watson is at present sales engineer to the Corporation Electricity Department, having been in the service of the undertaking for nearly 29 years. He started as a mains assistant, subsequently holding the positions of assistant mains engineer, and mains engineer. Since 1939 he has been sales engineer, responsible for the Installation and Sales Departments. He was chairman of the Northern Ireland Centre of the I.E.E. last year.

After Belfast Council announced its decision last Friday, Alderman Cooper said he was resigning from his position of chairman because "the Electricity Committee had refused to allow him to follow the normal procedure of asking the candidates to answer questions prepared by Mr. Girvan to assist the committee." At the meeting of the Electricity Committee earlier in the week, **Mr. W. J. McC. Girvan,** O.B.E., A.M.I.E.E., intimated that he was contemplating resigning his post of city electrical engineer and general manager as a protest against the attitude of the committee on the appointment of his deputy. Mr. Girvan has stressed that the Corporation would be committed to expenditure of over £13 million in power station development and it was therefore necessary that the most capable man should be appointed. But in Belfast, it is realised that the Corporation cannot afford to lose the services of such a brilliant engineer as Mr. Girvan and it is felt sure that some effort will be made immediately to get him to reconsider his decision.

Formerly development engineer, **Mr. S. E. Huddleston** has been appointed assistant to the manager (engineering administration) of the Electricity Trust of South Australia.

Mr. E. G. Fell, has been appointed export sales manager and assistant to the associate director of export to Enfield Cables Ltd., and will operate from Victoria House, Southampton Row, W.C.1. Mr. Fell joined Enfield Cables in 1945, after 22 years in the Cable Department of Siemens Brothers and Co. Ltd. He was one of the first members of an early cable apprenticeship scheme and served in the Test, Estimating and Designs Departments. During the war he was engaged on special development work.

Mr. E. G. Fell

Alderman Lewis, left, making the presentation

Our accompanying photograph was taken on the occasion of a presentation by **Alderman W. Lewis,** chairman of the Midlands Electricity Board, to **Mr. D. F. Embry,** following upon the latter's success in three national window-dressing competitions. Displays designed and executed by Mr. Embry on behalf of the Wolverhampton and District Sub-Area were successful in obtaining the second prize in the Smiths Clocks National Competition, first prize in the Hoover Competition for supply undertakings and two prizes in the Festival of Britain Competition organised by the British Display Association. In our photograph are, left to right, **Alderman Lewis, Mr. F. J. Elliott,** sub-area manager, **Mr. H. J. Gibson,** chief commercial officer, and **Mr. D. F. Embry** of the Wolverhampton sub-area.

To succeed **Mr. H. Nielsen,** who has resigned, **Mr. E. C. Davies,** A.M.I.E.E., has been appointed manager of the Heavy Plant section of the Engineering Sales Department of the General Electric Co. Ltd., with **Mr. G. F. J. Morgan** as his assistant. After serving his apprenticeship with the company, Mr. Davies joined the Engineering Design Department in 1924 and six years later took charge of the d.c. machine section. In this capacity he was responsible for the design of the new ranges of steelworks motors to the standards of the A.I.S.E. and for the development of the G.E.C. cascade excitor control system for all types of industrial drive. In 1935 he became welding adviser to the company, and has been chairman of the B.E.A.M.A. Technical Committee on Welding since 1940. In 1950 the B.S.I. appointed him British Representative of the Institute's Standard Committee on arc welding plant. Mr. Morgan served his apprenticeship with the G.E.C. after which he joined the Contract Department at Witton as an erection engineer on the installation of electrical plant at the Ebbw Vale Works of Richard Thomas and Baldwins Ltd. In 1941 he transferred to the Plant Progress Department of the Iron and Steel Control, and a year later joined the Royal Air Force where he served as an officer in the Technical Branch (Electrical) until he was demobilised in 1946.

He then joined the Steel Company of Wales Ltd., and in 1949 was engaged by McLellan and Partners as electrical engineer for the plate and sheet finishing and cold mills at the Abbey Works. He rejoined the G.E.C. last month.

Mr. J. McCandless, M.SC., M.I.E.E., M.INST.F., now a director of Burke and Son, of Belfast, and who a few months ago was deputy city electrical engineer at Belfast, has obtained an important appointment in Johannesburg managing a large engineering firm, it is reported. He is expected to sail for South Africa in about three months' time.

Dr. J. T. Hattingh has been appointed as chairman of the Electricity Supply Commission of South Africa, in succession to **Mr. A. M. Jacobs,** whose resignation we have already noted.

OBITUARY

Mr. W. Weygood, ASSOC.I.E.E., chief engineer to the Midland Electric Corporation for Power Distribution, Ltd., from 1936 till retiring at the end of 1943, died on January 28, aged 68. He had been associated with that company since 1906, and represented the concern on the West Midlands Joint Electricity Authority for seven years, for some time as vice-chairman of the Technical Operating Committee.

Mr. W. E. Richardson, M.I.E.E., district commercial manager, Aberdare district of the South Wales Electricity Board, died on February 3, aged 62. Prior to vesting day he was for twenty years engineer and manager of the Aberdare U.D.C. transport and electricity undertaking.

Mr. J. H. Macdonald, on the staff of Messrs. Merz and McLellan at Poole power station, died on January 27, aged 42. He had been with Merz and McLellan for about three years, and had seen earlier service with the London Power Co. (in Horseferry Road), with the Cornwall Electric Power Co., and the Air Ministry.

Mr. Frank Lonsdale, a director of the General Electric Co. Ltd., and late general manager of the Company's Fraser & Chalmers Engineering Works, Erith, died on January 27, aged 68. He joined Fraser and Chalmers in 1909 and, after a period in the turbine section, was appointed chief of the drawing office and subsequently manager of the turbine contracts department. In 1918, when the firm was taken over by the General Electric Co. Ltd., Mr. Lonsdale became sales manager, and in 1938 was appointed general manager. He had been a director of G.E.C. since 1946.

Mr. F. Lonsdale

Mr. F. H. Francis, M.I.E.E., formerly deputy manager and engineer of the Oxford Corporation Electricity Department, died on January 25, aged 80. Educated at Oxford Wesleyan Higher Grade School, Mr. Francis took an electrical engineering course under Dr. Sylvanus P. Thompson at London Finsbury Technical College, gaining second place in the City and Guilds of London Technological open examination in electric light and transmission of power in 1888. Short periods at the Gulcher Electric Light and Power Co., and the House-to-House Electricity Co., followed by about three months switchboard shift duty at the Sheffield Electric Light and Telegraph Co. preceded his appointment as assistant engineer to the Oxford Electricity Undertaking (at its inception) in October, 1890. He took an active part in the installation and maintenance of the original 640 kW generating plant, and in December, 1901, was appointed chief engineer to the Oxford Electric Co., which post he retained until the taking over of the undertaking by the Oxford Corporation at the end of 1931 when he became deputy manager and engineer. He retired at the end of April, 1936.

Mr. F. H. Francis

Mr. D. M. Robertson, manager of the Dundee branch of British Insulated Callender's Cables, Ltd., died on January 18, aged 63. He joined the former British Insulated Cables, Ltd., in 1919, and subsequently served for many years in the company's Glasgow office until his appointment to Dundee in 1946.

Mr. H. A. Wootton, a director of Falk Stadelmann and Co., Ltd., died on February 4, aged 70. He was a pioneer in the design and development of electrical accessories. Prior to joining Falks in 1930, he manufactured accessories trading on his own account as H. A. Wootton and Co., Ltd.

Mr. T. A. M. Roberts, sales director of Imperial Chemical Industries Ltd., Metals Division, died on February 3, aged 51.

Col. E. T. Brook, C.B.E., former superintendent of rolling stock (railways) to London Transport, died recently. He retired on March, 1945, after 41 years' service.

Mr. W. G. Groocock, who retired from the managership of the British Thomson-Houston Birmingham works on March 31, 1941, died on January 25, aged 81. He joined the company in 1918, and became manager of the Birmingham works 3 years later.

Mr. J. Magnall, a director of the North of England Engineering and Electrical Co. Ltd., died recently, aged 63.

M.P.s Discuss Hydro-Board

A DEBATE on the second reading of a Bill to extend the borrowing powers of the North of Scotland Hydro-electric Board to £200 m. gave members of Parliament an opportunity last week of discussing the workings of the Board.

In introducing the Bill, the Under-Secretary of State for Scotland said that the present limit on borrowing was £100 m., of which £94 m. had been authorised, and £56 m. actually borrowed. He stressed the usefulness of hydro schemes in terms of coal and iron economy, and said that the 282·9 MW of plant now in operation would have an annual output of 767 m. units when fully operative. In four years, over 76,000 new consumers had been connected by the Board, 54,000 of them in rural areas.

In the debate that followed, the main apparent concern of members was about the way in which the Board was either charging connection fees to crofters and isolated villages, or else requiring a comparatively high guarantee. Several members suggested that the charges were impracticably high, and that there was inequity in that they were being applied in some areas where a few years earlier adjacent villages had been connected with no charge. The Member for the Western Isles (Mr. MacMillan) specifically alleged that the Board had not lived up to the promises they gave in respect of uneconomic schemes. This same member echoed the fears of some others when he asked what would be the effect on guaranteed consumption agreements if cookers, irons and other domestic electric appliances became scarce or unobtainable as a result of material cuts.

Another discontent expressed by several members was the failure of labour-using industries to be attracted to the Highlands in spite of the availability of electric power. One suggestion made was that the railways of the North of Scotland should be electrified, so improving the transport system; power for the railways would come from the hydro scheme.

Economic considerations, other than the connection charge, did not figure very largely in the debate, though one member did point out that the Sloy, Morar and Lochalsh schemes, estimated in 1944 to cost £4·6 m., now looked like costing £9·2 m. The only representative of a non-Scottish constituency to speak, Mr. Nabarro, argued about the capital cost of hydro schemes, suggesting that they cost £332/kW against £50/kW for steam stations. It finally transpired that Mr. Nabarro was supporting the Bill in spite of the capital-cost question, because of its merits as a coal saver.

In his reply, the Under-Secretary began by dismissing the figures which, he suggested, formed the basis of Mr. Nabarro's argument. He was reserved concerning the effect of economic measures on investment, but assured the House that the Highland regions were being kept in mind. He blamed the guarantee and connection charge difficulties on the nationalisation requirement that a loss must not be made. With regard to composition of the Board, he refused to add to an earlier answer that any change would not impair special responsibility for the Highlands.

ELECTRIFICATION OF MECCA

THE Holy City of Jedda is shortly to have its first public electricity supply, for the electrification work is about to commence, much of the necessary equipment having arrived in the port of Jedda, Saudi Arabia. This equipment is part of a contract placed with the Brush ABOE group by E. A. Juffali and Brothers, of Mecca, on behalf of the Saudi Electric Co., who have obtained a concession from the Saudi Arabian Government for the public supply to Mecca.

The power station, which will have an initial output of 4,000 kW, to be later increased to 10,000 kW, is being constructed outside the walls of Mecca and equipment within the city will be erected under the supervision of Brush trained Moslem engineers, since the city is not open to non-Moslems. There will eventually be fifteen substations in Mecca itself. Equipment for the electrification scheme includes four Mirrlees-Brush diesel generating sets, two driving 700 kW alternators, the others driving 1170 kW sets.

Generation is at 11 kV, 50 cycles, 3 ph, the output being controlled by Brush 150 MVA totally enclosed, vertical isolation, horizontal drawout, oil immersed circuit-breakers. The nine-panel switchboard in the power station serves the alternators and outgoing feeders as well as the station auxiliaries.

The ring main transmission and distribution systems are being provided by British Insulated Callender's Cables as sub-contractors. The overhead transmission system comprises approximately 3,200 yds of double and 3,300 yds of single circuit 11 kV line and the overhead distribution comprises 4,000 yds of 3 ph, 4 wire line.

Transmission is through 11 kV underground cables from the power station to a point approximately 250 yds away and thence by overhead line to three main substations. These are looped into a ring main with spur feeders. The substations comprise outdoor type transformers of 300, 200 and 100 kVA capacity, stepping down to 415 V, 3 ph, 4 wire and controlled through ring main switching units on the h.t. side and B.I.C.C. tailless units on the l.t. side. Street lighting is controlled by automatic type switches from the substations. Distribution is by underground cable and o.h. lines. Supervision of work inside Mecca will be in the hands of Mr. N. A. Malik, of Karachi, who recently visited England to familiarise himself with the equipment. Consulting engineers for the whole scheme were Preece, Cardew and Rider.

The BUYER'S *Column*

Price Increases

SUBSEQUENT to our note in the January issue about price increases brought about by rising material and labour costs, a further turn of the vicious spiral comes in the form of increase announced by four other firms.

The first note, by JULIUS SAX AND CO. LTD., 24 Commerce Road, Brentford, Middlesex, relates to price increases on March, 1950, list and outstanding quotations of plus 120% advance, less 25% trade discount, which cancels the existing 110% advance. This is with effect from February 4, 1952.

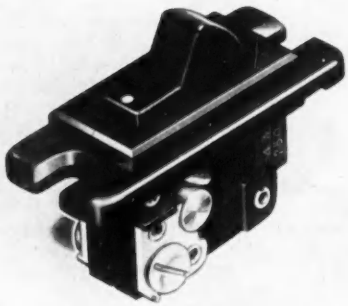
Secondly, GEO. H. SCHOLES AND CO. LTD., Wylex Works, Wythenshawe, Manchester, announced that as from February 1 list prices in catalogues W.868 and W.870 are advanced 15% instead of 10%.

BULPITT AND SONS LTD., Swansea Works, Birmingham 1, announce increases in the price, as from February 1 of "Swan Brand" groundbase aluminium holloware for electric cookers. These are listed in leaflet No. 216, issued last week. The price of the "Swan Brand" electric toaster, list No. 950, is increased to 32s 6d as from the same date.

Lastly, but not least, is a note from the MIDLAND ELECTRIC MANUFACTURING CO. LTD., Tyseley, Birmingham, which advises of a further 10% increase in prices, making the surcharge 15% upon prices shown in current catalogues and lists. It is in operation from February 4.

Arrow market New Switch

DUE for release on February 16, by ARROW ELECTRIC SWITCHES LTD., Hanger Lane, Ealing, W.5, is a small appliance switch fitted with rocker-arm lever providing an easy, simple method of control.



Arrow's new appliance switch has been developed from the standard model so popular with manufacturers

It is neat and compact and has been developed from one of Arrow's standard appliance switches long popular with manufacturers. Rating of the new switch is 4 amp at 250 V or 6 amp at 110 V.

Frequency Meter—New Pattern

ELECTRICAL INSTRUMENT CO. (HILLINGTON) LTD., Boswell Square, Hillington Industrial Estate, Glasgow S.W.2, have developed a new type of frequency meter.

Instead of the usual chokes or condensers working in series with the movement, two parallel a.c. bridges are used. One of these bridges is in balance at or below the lowest range of the instrument, whilst the other bridge is in balance

This is the new frequency meter developed by the Electrical Instrument Co. (Hillington) Ltd.

at or above the highest range to be measured. The output of each bridge is rectified and the two rectifiers form a d.c. bridge actuating the centre zero millivoltmeter calibrated in frequency.

The instrument illustrated is a rectangular type, 6 in. by 5 in. approximately, but the indicating instrument itself can be made in any standard size of moving-coil instruments.

The external reactance box is a cube of approximately 5 in. The scale of this instrument is perfectly even and the price compares favourably with other constructions.

A Necessary Provision

THE employment in industry during the war years of many thousands of women focused the managerial eye on the provision of adequate arrangements for the maintenance of feminine hygiene and health.

Wars, unfortunately, mean the incidence of casualties both civil and military and the distressing numbers of wounded stimulated an intensive

amount of medical research. Not a minor factor in the efficiency of any medical unit was the provision of facilities for the destruction of contaminated dressings.

This research work culminated in the introduction by Barrywald Products Ltd. of the Barrywald automatic electric incinerator which is manufactured in Great Britain by Applied Electrical Products Ltd., and distributed by SANIGUARD APPLIANCES, LTD., 62 London Wall, E.C.2.

This incinerator is designed for wall mounting and is finished in stoved cream enamel with fittings in black. It is fully automatic and entirely safe and foolproof. The 1 kW element which is brought into circuit as a sequence of the movement of the opening lever ensures complete and rapid destruction of the material deposited.

Dimensions of the unit are 19 in. x 18 in. x 10 in., and the price delivered free in the U.K. is £30.

"Staffa" Introduce 2/3 ton Mobile Crane

THE "Staffa" 2/3-ton mobile crane, now in production by CHAMBERLAIN INDUSTRIES LTD., Staffa Works, Staffa Road, Leyton, London E.10, and due to be marketed early in 1952, is of extremely robust construction and suited for general industrial use and work on airfields, building sites, dockyards, etc.

The company's experience in the reconditioning of wartime British and American cranes has led to the evolution of the "Staffa" mobile crane, capable

Staffa's new mobile crane embodies the advantages of wartime crane developments both British and American

of fulfilling similar functions, but with considerably improved performance due to the introduction of new and novel features.

An outstanding feature is the provision of a robust hydraulic ram for raising and lowering the jib. Motion is controlled by a conveniently placed lever operating a valve which is completely enclosed within a generous oil reservoir. An engine-driven hydraulic pump supplies the power.

The hoisting mechanism comprises a fan-cooled worm reduction gear, upon which is mounted the grooved drum conveying 65 ft of ⅜ dia. (6 by 37) construction wire rope, made from 100/110 tons/sq in. best plough steel. Power is transmitted by a propeller shaft and chain drive from a special marine-type forward and reverse box, situated at the rear of the crane.

The crane itself is powered by a Newage/Austin industrial type o.h.v. petrol engine of 1,200 c.c. capacity, developing 15 b.h.p. at 1,800 r.p.m.

Transmission is from a dry single-plate clutch and synchromesh gear box, providing four speeds forward and one reverse, the power being transmitted by a propeller shaft, with needle roller-bearing universal joints, to a sturdy driving axle incorporating differential and double reduction driving head.

The two steering wheels are trunnion mounted and turned through 150° within chassis length by worm and segment gearing coupled by a longitudinal shaft to the steering column.

A feature of special note is that the crane is constructed on the unit principle, so that if any major part requires replacement, a complete sub-assembly can be supplied for mounting into the main chassis, jig-drilled locating holes being used throughout to ensure interchangeability. Replacement units can thus be sent to all parts of the world, since although the internal construction may vary, due to the logical course of future development, the locating holes are always the same size and in the same position.

Tudor Batteries for Colliery Signalling

THE conventional system of d.c. power supply for shaft signalling employs a battery and floating rectifier. The rectifier equipment may have manual adjustment of the output or alternatively an automatic constant potential rectifier assembly may be incorporated, but in either case a system whereby the battery normally floats across the rectifier at a voltage equivalent to 2·3 volts per cell is recommended. This is principally to ensure that an absolutely fully charged battery is available for an emergency in the event of a mains interruption, when the battery would have to supply the load unassisted. The normal floating trickle charge voltage of 2·3 volts per cell may be considered too high for ome installations and to ensure close voltage limits under all conditions, the engineers of the TUDOR ACCUMULATOR CO. LTD., Barnmeadow Works, Dunkenfield, Cheshire, have developed a special Dual Battery Automatic Equipment.

This equipment is the first on the market, having automatic charge and discharge, and automatic battery change-over features resulting in the minimum of supervision being required. The equipment provides a completely reliable d.c. supply with minimum voltage limits. The signalling load is supplied at all times by one of two duplicate batteries, the change over from one to the other being effected automatically as one battery becomes discharged.

Control of the discharge and charge cut-off points is effected by recording and actuating ampere-hour meters, A.H.1 and A.H.2. Contacts in these ampere-hour meters operate relay circuits which in turn operate other contactors. Alarm relays are also provided to give warning of failure of charge current and of a.c. supply to rectifiers.

MORE STANDARD TARIFFS

South Wales and the S.E. Scotland Boards' Rates

COMPLETE standardisation of all tariffs in one operation (except special power contracts) is the aim of the South Wales Electricity Board—one of the two area boards to announce details of their new proposals. Three standard tariffs have been formulated—domestic, commercial and industrial. The standard domestic tariff conforms to the pattern of the other boards, with a primary charge of 4½d. per unit for the first 10 units per room p.q. (minimum 20), additional units being charged at 0·85d. p.u. For houses with more than 10 assessable rooms, there are 10 primary units for each of the first ten and 5 units for additional rooms, at the 4½d. rate. There is no additional charge for prepayment meter consumers, but credit consumers paying accounts within 21 days get a 2½% discount.

Commercial

For commercial consumers there are two tariffs available, e.g. a block rate and a two-part maximum demand tariff. Under the former there is a primary charge of 4½d. per unit for consumption based on floor area, and all excess units are at 0·85d. p.u. In the case of shops there are 20 primary units per quarter for up to 60 sq ft or less floor area, plus 5 units per quarter for each additional 15 sq ft. For churches, chapels, public halls, schools and colleges, there are 20 primary units p.q. for up to 400 sq ft, plus 5 units for each extra 100 sq ft. All other premises to which the tariff applies are allowed 20 units p.q. for up to 120 sq ft plus 5 units for each extra 30 sq ft. For larger commercial consumers whose maximum demand exceeds 20 kW there is a fixed charge of £5 12s. 6d. per kW of m.d. in each year, plus a running charge of 0·68d. p.u., together with the usual fuel variation clause.

On the industrial side, there are two alternatives at the consumer's choice where the m.d. is in the range 20 kW-50 kW. The first is a block rate tariff under which, where supply is not above 650 V, the initial 1,000 kWh per month are charged at 2d. p.u., the next 5,000 kWh at 1·75d. p.u., and all in excess at 0·85d. p.u. Where the supply is at above 650 V there is a 10% reduction on those charges. The second is a two part m.d. tariff under which, for supply at 650 V or less, there is a charge of (a) £5 12s. 6d. per kW of m.d. per year or (b) 11s. per kW of m.d. per month, with a running charge of 0·68d. p.u. for both. Where the supply is above 650 V, the alternative rates are (a) £5 2s. 6d. per kW of m.d. per year, or (b) 10s. per kW of m.d. per month, in each case with a running charge of 0·62d. p.u.

No date has yet been fixed for the operation of all these tariffs; in placing these proposals before the area Electricity Consultative Council last Thursday, the Board gave notice that they propose to vary the standard tariffs for the purpose of raising additional revenue in order to meet the increased costs, including a substantial rise in the price of coal.

S.E. Scotland

A new standard domestic tariff, and increases in the existing commercial and farm tariff, to operate with effect from January 31 last, are announced by the South East Scotland Electricity Board. The new domestic tariff is really split into three sections, the first of which, applying throughout the area, except in Edinburgh, Kirkcaldy, Falkirk and Newton, provides for a primary charge of 4½d. per unit for the first 120 units a year. The second portion relates to Kirkcaldy and Falkirk where the primary charge is 4½d. per unit for the first 96 units a year, while the third section applies to Edinburgh and Newton, which have a primary charge of 3¼d. for the first 120 units a year. In each case the excess units are at ¾d., and for prepayment supplies a ½d. is added to the primary unit charge.

In regard to the other adjustments, commercial tariffs have been increased by 10%, while under the farm tariff the unit charge has been raised from ⅝d. to ¾d.

These changes, which were approved by the area Electricity Consultative Council last Thursday, have been made necessary by increasing costs, for the board estimates that the year to March 31 next will result in a deficit of about £100,000. The new standard domestic tariff will replace 24 separate tariffs in force in the area. While consumers in Edinburgh, Falkirk and Kirkcaldy will continue to enjoy lower rates than in the remainder of the area they will experience a greater percentage increase than other consumers. The changes are estimated to increase revenue by £400,000 per annum of which about £305,000 will come from domestic consumers.

PULVERISED FUEL

RECENTLY published by International Combustion Ltd., 19 Woburn Place, W.C.1, is an excellent booklet entitled "Coal Milling and Pulverised Fuel Firing." This traces the development of pulverised fuel firing from the early days to its present state of advancement. The various types of mill are described and illustrated, and the complications of drying discussed.

As far as the actual combustion is concerned, several types of burner and burner arrangements are dealt with, including the tilting burner and its operation for control of superheat temperature. Finally, a section is given on furnace construction and operation. Several sections of modern pulverised fuel boilers are included.

Detecting the Unlicensed Viewer

STATISTICS gained from the Radio Manufacturers indicate that there are in circulation some 350,000 more television sets than television licences. Of this number it is estimated that about 200,000 are held by traders and retailers, leaving between 100,000 and 150,000 unlicensed sets in operation.

In order to detect these receivers, irrespective of whether an outdoor or indoor aerial is being used, the Radio Experimental Laboratories of the Post Office at Dollis Hill have developed a new technique.

The equipment is mounted in a small van and is quite easy to operate; in fact, with a little practice, houses containing working receivers can be located and identified while the van is on the move.

The detection equipment uses the induction magnetic field set up by the line-scanning coils of the television receiver. This field contains strong harmonics of the fundamental line-scanning frequency of 10·125 kc and these can be picked up by a sensitive receiver.

Three horizontal loop aerials are employed; these are tuned to the second harmonic (20·25 kc) of the line frequency, and are mounted on the roof of the detector van in an "L" formation. The outputs of the loops can be switched in turn to the input of the radio receiver and its audio output heard either on a loudspeaker or indicated on an audio level meter. By noting the relative levels of the signals from the three loop aerials the operator can obtain a clear indication of the location of the television receiver. The strength of the induction magnetic field varies inversely as the square of the distance, and this enables receivers, even in adjacent houses, to be separately detected. The brick walls of ordinary houses have little or no effect on the induction magnetic field at the relatively low frequency used.

The G.P.O. is most unwilling to start a snooping campaign to be followed up by prosecution, and believes that many viewers may have forgotten to take out television licences.

SOUTH MIDLAND I.E.E. DINNER

SOME 460 members and guests were present at the annual dinner of the South Midland Centre of the I.E.E., which was held last Friday at the Grand Hotel, Birmingham. The Chairman of the Centre, Mr. W. H. BRENT, B.SC., M.I.E.E., recalled, in proposing the toast of "The City of Birmingham," that when the Birmingham Corporation took over electricity generation in 1900 the thermal efficiency of the plant was 4%. This had risen, through the Hams Hall station to the present figure of 28·5%. He was loudly applauded when he suggested that if thermal efficiency could be made proportional to the cost of coal nobody would grumble!

Major-General S. W. JOSLIN, C.B., C.B.E., M.A., M.I.Mech.E., M.I.E.E., Director of Mechanical and Electrical Engineering, The War Office, proposing the toast of the I.E.E., referred to himself as a two-headed monster, being responsible for the electrical and the mechanical training of the Army, and appealed for the support of Members in the recruiting of electronic artificers.

SIR JOHN HACKING, M.I.E.E., the President of the Institution, replied to Major-General Joslin's toast, and told the company that the South Midland Centre was the first of four centres formed in 1899-1900; it rapidly became the largest, a position which it still maintains today.

In his five years as a Vice-President, he had visited many centres and the work they were doing, and their enthusiasm, was most exhilarating.

He was glad to see that manufacturers were so well represented in local centres, and he thought that while electrical manufacturers were, at the moment, the second largest exporters in the U.K. there was quite a possibility that if motor manufacturers were forced to reduce their exports as a result of steel shortages, the electrical industry would assume the position of first priority.

Sir John, referring to education, stressed the importance of seeing that the Young Idea is knowledgeable about essentials, and the necessity of ensuring that there was an adequate entry from schools into the electrical industry.

Observing that power cuts had been less severe this winter, he said that this was not, as some had suggested, because of any political influence, but to the efforts of electrical engineers and maintenance staffs, and to the co-operation of the Regional Boards for Industry who had accepted the principle of a 20% reduction in demand. The industrial demand, in fact, fell short by 400 MW of the figure which had been anticipated.

An increased amount of plant available and the comparatively milder weather so far had also assisted, and it was to be hoped that the present load-spreading arrangements would hold good for the remainder of the winter.

Referring to Major-General Joslin's appeal for the recruitment of electronic artificers, Sir John said that he hoped the R.E.M.E. would follow the lead of the Navy in providing training for officers which would qualify them for future civilian posts in industry.

THE WEEK

COMMERCE *in news* INDUSTRY

Distribution Scheme Amended

COINCIDENTAL with the inauguration of the iron and steel distribution scheme last Monday, a number of adjustments were announced by the Ministry of Supply under their Iron and Steel Distribution (Amendment No. 1) Order, 1952 (S.I. 172). Broadly, the adjustments are as follows. Two new items have been added to the list of controlled forms of steel. These are wire rod reinforcement fabric mesh and wire reinforcement fabric mesh, and the list of small quantity exemptions has been extended to allow the purchase without licence of 5 cwt a month of these items as well as one ton a month of "large spring." Consumers may use stock held before last Monday for a purpose for which they hold a control authorisation. Finally, the holder of a control authorisation may send out material on loan to be worked up for him. The Ministry has also announced that as from April 1 the separate allocation of non-alloy steel sheet will be abandoned.

Limit on Hire Purchase

VERY few readers will have failed to note the Chancellor of the Exchequer's "little budget" or his reference to hire purchase agreements. Following his statement in the House of Commons last week the Board of Trade have made an order restricting the terms for initial deposit and repayment period on numerous goods. Many of these apply to the electrical industry, though a notable exception is the cooker. Most prominent among items listed are radio and television sets, aerials and cathode ray tubes, drying cabinets, irons, refrigerators under 12 cu ft, dish washers, washing machines, floor polishers, vacuum cleaners, sewing machines and office machinery. Second-hand goods are also included.

The order affects agreements in two ways. In the first place it fixes initial deposits at 33⅓% and, secondly, prescribes a maximum period of 18 months for repayment of the balance. The Board has also issued an order amending the existing one which controls service charges on price-controlled goods. The orders are Hire Purchase and Credit Sale Agreements (Control) Order, 1952 (S.I. 121), and Hire Purchase and Credit Sale Agreements (Maximum Prices and Charges) (Amendment S.I. 2) Order, 1952 (S.I. 122), and became operative on February 1.

Restriction on Employment

AS in the case of hire purchase above, much has been written in anticipation of the Notification of Vacancies Order, including a report in these columns last week. The order has now been made by the Minister of Labour and National Service, and its contents are much the same as has been forecast. An employer must not engage workers between the ages of 18 and 65 (if a man) or 60 (if a woman) except through an employment exchange, unless he be in one of the excepted employments. The order does not apply to part-time or unpaid employment, casual work not for employers' trade or business, and employment in managerial, professional or executive capacities. Neither does it apply to men leaving the Forces, disabled persons, workers whose jobs have been interrupted, or posts abroad. The advertising of jobs will not be prohibited but the offer should make it plain that applicants must apply to an exchange. The new arrangements become effective as from February 25.

Office provided for Agents

ACCOMMODATION has now been provided at the Engineering Centre at 351 Sauchiehall Street, Glasgow, for a limited number of engineering firms' agents or representatives. There have been numerous requests for such office facilities in recent months and it is to satisfy these enquiries that some 1,000 sq ft of office space has been furnished with tables, desks, private lockers and telephone booths. The number of participants has had to be limited to about 20. The facilities offered include the use of the centre's address and telephone numbers as well as the catalogue library (recently inaugurated) and information service. In addition, letter typing can be undertaken either from copy or dictation. This latest

The First Half-Century

After giving a rapidly delivered, highly compressed, and, it must be said, somewhat unequal history of the development of what is now the only orthodox theory of solution and electrolysis, Dr. Crum Brown ended his discourse at the Royal Institution last Friday with the remark that sometimes he was asked if he really believed it. The answer was not 'yes' or 'no,' but that he looked upon it as 'eminently useful,' and to be taken as a valuable guide. Moreover, the existence of a theory of any kind was beneficial, and a certain amount of the spirit of partisanship regarding it stimulated research.—*From our issue of February* 6, 1902.

The new mechanical device and excavator to be used in removing London's 60,000 tons of tram rails

service will no doubt be of advantage to firms contemplating the appointment of Scottish representatives.

Tram Tracks up Quickly

TRAM rails of the type embedded in London streets weigh about 100 lb/ft. From this it has been suggested that the total weight of steel uselessly entombed in the Metropolis is 60,000 tons. Obviously it is worth while making some considerable effort to get this scrap to the steelworks, and only the cost of manual removal has prevented a more determined attack being made on the problem. Speeding up the removal by mechanical means would tend to make the process an economic possibility, and it is with this consideration in mind that George Cohen, Sons Co. investigated the problem.

Their solution takes the form of the mechanical device shown in the accompanying illustration; used in conjunction with a large excavator, this will deal with just over half a mile of rail a day; i.e. something over 220 yds. of double track. Moreover, it is confidently believed that this rate can be substantially increased as operators become more skilled. Possibilities of the machine were recently demonstrated at Tottenham.

OFFICIAL PUBLICATIONS THIS WEEK

COPPER AND ZINC PROHIBITED USES (MINISTRY OF SUPPLY) (NO. 3) ORDER, 1952. H.M.S.O., 2d. S.I.123. *(See our Jan. 10 issue.)*

HIRE PURCHASE AND CREDIT SALE AGREEMENTS (CONTROL) ORDER, 1952. H.M.S.O., 3d. S.I. 121. *(See page 269.)*

HIRE PURCHASE AND CREDIT SALE AGREEMENTS (MAXIMUM PRICES AND CHARGES) (AMENDMENT NO. 2) ORDER, 1952. H.M.S.O., 2d. S.I. 122.

NOTIFICATION OF VACANCIES ORDER, 1952. S.I. 136. *(See page 269.)* H.M.S.O., 3d.

IRON AND STEEL DISTRIBUTION SCHEME (AMENDMENT NO. 1) ORDER, 1952. H.M.S.O., 4d. S.I. 172. *(See page 269.)*

EXPORT OF GOODS (CONTROL) (AMENDMENT NO. 5) ORDER, 1952. S.I.132 H.M.S.O., 3d. *Incl des, among other items, reference to X-ray apparatus.*

REPORTS ON PLASTICS IN TROPICS.
1. *Expanded Plastics.* H.M.S.O., 1s. 6d.

OVERSEAS ECONOMIC SURVEY.
Bolivia. (See page 272.) H.M.S.O., 1s. 6d.
Switzerland. (See page 271.) H.M.S.O., 4s. 6d

Pit-head Generation

NEGOTIATIONS are in hand between the B.E.A. and National Coal Board for the generation of electricity at pit-heads by using coal hitherto considered unsaleable. This information was given by Mr. A. Haselhurst, Yorkshire Electricity Board's chief commercial officer, at Bradford last week. The scheme formed part of a long-term policy, he said, but it provided an example of how the B.E.A. was endeavouring to meet the difficult supply problem.

Malta's Problems

DEPARTING from the more familiar and somewhat lurid stories of Malta in wartime, Rear-Admiral C. P. Clarke, C.B., D.S.O. (deputising at short notice for Rear-Admiral Raw) gave an interesting and informative talk on the political, social and economic conditions in the island, at last week's luncheon of the Batti-Wallah's Society. Many of the administrative problems which arose during his period at that base, such as the question of income tax applicable to dockyard employees sent out from Britain were particularly thorny, he admitted. After drawing attention to the urgent need to expand local industry, he referred to the existing power station (built in 1894) which is shortly to be augmented, while the 100-cycle distribution network was also being changed to a 240/415V, 3 ph, 50 c/s system.

Electric Heaters at Air Terminal

WITH the object of saving as much space as possible for passengers at the Kensington Air Terminus of British European Airways, the original forced air convector heaters have been replaced by 24 G.E.C. unit heaters secured to the walls. Besides conserving floor space, the new type of heater has the additional advantage of circulating warm air during winter and cool air in summer.

Total loading of the installation is 110 kW. This consists of fifteen 5 kW heaters and nine 3 kW heaters, all of which are strongly built and quiet in operation. The open-coil spiral heater element operates at 'black heat' and is protected against overheating by a thermal cut-out. The

motor is totally enclosed and fitted with self-oiling, self-aligning and noiseless bearings, and apart from occasional lubrication, the units require no maintenance.

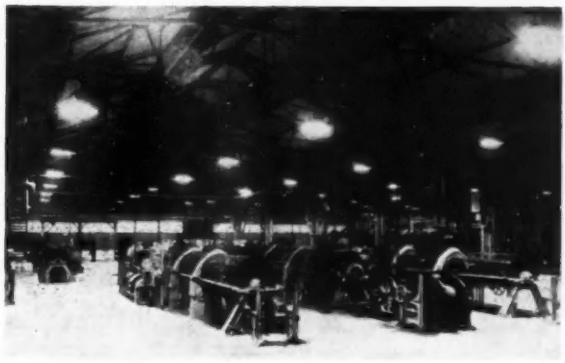
Laurence Scott Rearranges Works

THE effective capacity of Laurence, Scott and Electromotors, Ltd.'s three main works has been considerably increased following the acquisition of some existing buildings for operations which do not require heavy crane lifts. At the Gothic works in Norwich the company has transferred the light machine shop, control gear case-making department, notching and blanking presses and associated stores to accommodate an extension of the heavy winding shop in the space under cranes. A threatened bottleneck caused by a new continuous process impregnating plant being put into operation for small-medium size induction motors has been averted by establishing a "satellite" shop in an existing modern building.

Part of the new notching and blanking press shop following some reorganisation of premises carried out by Laurence Scott and Electromotors, Ltd.

Blended Lighting at Henleys

SINCE it was first manufactured for the Steel Company of Wales project, the British Thomson-Houston Co., Ltd.'s blended lighting has gained in popularity as a means of providing high-bay illumination in factories. One of the most recent installations of this kind was at the Birtley works of Henley's Telegraph Co. About 150 Mazda T206 fittings were used, of which 132 illuminate the main factory building. Each unit houses a 400 W mercury vapour and 500 W tungsten lamp, and is mounted at a height of 17 ft.



Part of Henley's factory at Birtley illuminated by Mazda T206 blended lighting fittings

Three Millionth Motor Traced

WAY back in March of last year we reported in these columns the singular achievement at British Thomson-Houston Co., Ltd.'s Coventry works of the production of their three millionth fractional h.p. motor. We noted at the time that far from becoming a museum piece, the motor would form one of a batch of 5,000 ¼ h.p. 110V induction motors for a repeat order from the Canadian General Electric Co. News of this unique piece of equipment reached us last week from the Dominion. It transpires that at a ceremony at Toronto City Hall it was presented by Mr. R. H. Saunders, chairman of Hydro-Electric Power Commission of Ontario, to Mr. J. A. Northey after his election as president of the C.N.E. Association. Present at the ceremony was Mr. H. G. McHaffie, who was appointed by the B.T.H. Export Co. last March to represent that concern in Canada.

The Swiss Electrical Industry

ON a previous page is contained the views of a visitor to Switzerland in the seventh Caroline Haslett Trust Lecture. Other facts on the same country are to be found in the Overseas Economic Survey just published by H.M.S.O. Figures extracted from the annual report of the Federal Electricity Department show the development in the output of electricity. In 1949-50 total output in Switzerland was 10,770 million kWh, as compared with 7,176 in 1938-39. Consumption during the corresponding years (also in million kWh) was 9,885, and 5,613. Installed capacity at the end of 1949 was 2·7 million kW, which was estimated to rise to 2·95 million by October this year. It is also estimated that even a low level water supply will furnish 5,000 million kWh in the winter of 1955-56, as against 4,250 million this present winter. Domestic installations were more than doubled during the decade ending 1949 and included some 395,000 cookers, 2,450,000 heating appliances, 16 million lamps and 75,000 refrigerators. In the home market, we learn, stocks of small motors and plant have been disposed of

Among the first pictures of medium-power television installations at the B.B.C.'s Kirk O'Shotts station was this of the semi-circular control desk. It shows Marconi and B.B.C. engineers during transmission tests which began a week or two ago

easily and higher export sales in 1950 included electric locomotives, dynamo-electric plant and hydraulic motors.

Great Reserve of Hydro Power

POSSIBLY one of the last places which would cross the mind of manufacturers as a prospective market for their goods is Bolivia. Many times the size of Britain it has a population under half that of London. This South American republic has no coastline, and as such presents a problem as regards communications. Living standards range down to the primitive existence of inhabitants of the Amazon basin, yet in the towns there are most of the modern services and amenities.

The latest Overseas Economic Survey for Bolivia, just published, states that import of such items as dynamos, motors, transformers and insulators has declined in recent years, but there has been a corresponding rise as regards wiring, dry cells, and domestic appliances. The installation of new and re-equipping of old power stations has necessarily been limited by post-war supply difficulties, but existing plans provide for a large expansion which, in present circumstances, will have to be spread over a number of years. There are in all 23 electricity undertakings in Bolivia, with a total installed capacity in 1947 of 73,476 kW, 55,494 kW of which was hydro. A great reserve of hydro energy is available, but no comprehensive survey has been made and no detailed information is at present readily to hand.

Course on H.V. Circuit-breaking

OPENING at The Polytechnic, Regent Street, W.1, on February 29, is a special course of six lectures on "High-Voltage Circuit-breaking and Allied Problems." Succeeding talks, all of which will be illustrated by slides, are scheduled for following Fridays and each will begin at 6.30 p.m. The lecturers are all members of the British Electrical and Allied Industries Research Association, and their subject-matter is to be presented in such a way as to be understood by those of average scientific attainment. Adequate attention will be paid to the impact of research on switchgear design. Enrolment forms and further details may be obtained from Mr. W. H. Date, head of Electrical Engineering Department. Fee for course is 20s.

Complaints against Y.E.B.

DONCASTER electrical contractors are protesting against unfair competition on the part of the Yorkshire Electricity Board. This latest protest arises from the Board's distribution of a gift to some 50,000 consumers in the district of a printed card bearing 5 amp and 15 amp fuse wire. The card also invited consumers to contact the Board for repair work or in the event of difficulties. Contractors maintain that the Board are getting in the thin end of the wedge with their invitation, and point out that contractors are selling fuse wire at 4d. a card. The Y.E.B. has replied to the effect that the gift may prevent fires in houses which have recently been connected and where residents are unused to electricity. Contractors are perfectly at liberty to do exactly the same, stated the Board.

The local Chamber of Commerce also has other complaints under consideration. In the same area, it is said, the Y.E.B. do contract work but are at the same time the examining body for the work of private contractors. It is also alleged that while private traders are restricted to 18 months hire purchase credit, the Board is allowed up to seven years. Consequent upon these complaints the Chamber has circularised relevent members asking whether they consider the B.E.A. have any advantages in competing with private firms.

Equipment for Tankers

AN order for the complete electrical equipment for ten tankers belonging to the Anglo-Saxon Petroleum Co. and Eagle Oil and Shipping Co. has been received by the G.E.C. Each set of equipment will include two 550 kW, 440 V, 3-phase alternators, gear driven by steam turbines at 1,200 r.p.m. The ships will each be fitted with a 200 kW alternator, diesel driven at 600 r.p.m. and about 25 motors ranging from 1·5 h.p. to 178 h.p. for pumps, fans, steering gear and other duties. The switchgear will comprise a steel cubicle type main switchboard, with withdrawable

air break circuit-breakers, for controlling the generators, power supply, lighting and auxilliary services; also two cubicle type group starter switchboards for controlling the motors.

The same company has also received a £2 million contract recently from British Railways (S.R.) for equipment for some 52 substations. This forms part of the frequency conversion scheme. The apparatus comprises 48 pumpless steel tank rectifier equipments and 33 kV 750 MVA e.h.t. switchgear.

The Dow Prize Competition

IDEAS for the layout, artificial lighting and decoration of a ground floor showroom will be the basis of a competition instituted this year by the Illuminating Engineering Society in memory of John Stewart Dow and in virtue of a bequest made by him. The Dow Prize Competition, as it is entitled, is intended to encourage collaboration between students of illuminating engineering and students in other fields in which applied lighting plays an important part. The winning entry will gain a total cash award of £75 and a certificate will be presented to each member of the winning team. While entries from individuals will not be excluded, the competition is primarily intended for joint efforts. All candidates must have been born on or after April, 1926, and must show that they are taking or have taken instruction in appropriate fields. Relevant documents with instructions will be available from the I.E.S. on April 1.

E.A.W. Exam. Results

RESULTS of the 30th and most recent examination for the E.A.W. Certificate in Electrical Housecraft, held on December 13 have been announced. The exam. took place in 18 centres throughout the country and included one centre as far afield as Colombo, where incidentally, the entrant was one of three candidates gaining distinction. In all 41 candidates were successful, bringing the total number of certificate holders to 1,740. Five of the 59 candidates gained distinction and 50 passed in the 27th Certificate Examination for Teachers held on December 15. In the second E.A.W. exam. for Electrical Sales Assistants, 33 candidates were successful.

Tariff for Glasshouses

A REVISED tariff for glasshouses on farms has been announced by the Midlands Electricity Board and approved by the Consultative Council. It has been decided that in future the charge will be 4d. per unit for the first 30 per 5,000 sq ft of floor area per quarter. Thereafter the charge will be 1d. per unit as before. Previously, the tariff was 4d. for the first 30 per 1,000 sq ft of floor space.

Profiteering on Resale of Power

THE prevention of landlords making exorbitant profits from the resale of electricity was again discussed by the N.W. Consultative Council at their recent meeting. The Council urged speedier action in amending the Electricity Act by the inclusion of a safeguarding clause, and complained that after a two-year campaign to this end, action had still not been taken.

Discussion arose on a letter from the Ministry which stated that they were considering the introduction of legislation to give electricity authorities the same power as area gas boards had to determine at what price gas should be resold. It was alleged that following an investigation of one case, a syndicate was found to be making hundreds of pounds profit—such profiteering, it was alleged, was rampant.

Fined for leaving trench Open

A FINE of £2 was imposed on No. 5 sub-area of the Yorkshire Electricity Board recently following an accident in which a nurse fell into a trench which workmen had dug in a footpath and left unprotected after dark. The nurse suffered bruising and considerable shock. Defendants admitted forgetting to send lamps to light up the

Photograph shows the Postmaster-General, The Rt. Hon. Earl De La Warr (right) discussing radio telephone equipment with officials of Automatic Telephone and Electric Co., Ltd., during his visit to the company's Strowger Works recently. After lunch he was conducted on a tour of the factory and shown Strowger automatic telephone equipment in all stages of manufacture. He was accompanied by Mr. H. A. Ashton (deputy regional director, N.W. Area), Colonel R. E. Evans (Head Postmaster, Liverpool), Mr. H. C. Jones (telephone manager, Liverpool) and Sir Thomas Eades (vice-chairman and managing director, A. T. and E. Co., Ltd.)

trench which was not enclosed by ropes. A man was left on the site to guard the hole, but it was a long trench and at the time of the accident he was at the other end it was stated.

NEWS IN BRIEF

The International Machine Tool Exhibition is to be held at Olympia this year between September 17 and October 4. It will be the first exhibition of its kind in Britain since the Machine Tool and Engineering Exhibition of 1948.

H. J. Enthoven and Sons, Ltd. will open a new section of their solder factory at Croydon shortly. Official opening date has not been fixed but production is expected to start early in March.

The contract for instrumentation of a large coke oven plant at St. Louis, U.S., has been received by Bristol's Instrument Co., of Weymouth. The plant is being built by another British firm, Simon Carves Ltd. The instrument control panel measures 20 ft by 7 ft and will measure, record and automatically control pressures, temperatures and rate of flow.

A new course for teachers comprising practical instruction in the use of domestic electrical apparatus is being given on the four Tuesday evenings in February at E.A.W. headquarters, Grosvenor Place, S.W.1. Each class begins at 6.30 p.m. and is conducted by Miss M. E. Bailey, head of the housecraft department.

An illustrated leaflet to include all new models displayed at the recent Hotel, Restaurant and Catering Exhibition, was produced by Simplex Electric Co., Ltd. in a record time of 72 hours.

Questions in Parliament

Economic Measures

In his review of the economic situation last week, the Chancellor of the Exchequer said that imports of coal from the U.S. would be reduced by £2·5 m. Total home deliveries of plant machinery and vehicles for civil use were to be cut by £150 m. to £200 m. at current prices below the 1950 level. In making this cut, it was necessary as far as possible to protect basic essentials such as the fuel and power industries, but even for these expansion could not be indefinite. The Government were relying on industry to limit its demands on engineering industries, while the output of domestic equipment for the home market would be cut to about two-thirds of last year's level. Hire purchase restrictions would be applied in this field.

Electricity Meters

The second reading of the Electricity Supply (Meters) Bill last week occasioned a debate lasting less than half an hour, in which it was explained that at present out of 15·5 m. electricity meters in the country some 4 m. were uncertified. To replace these by June 30, 1953, would necessitate special manufacturing arrangements and involve a capital cost of some £3·5 m. Postponement to 1958, which the Bill proposed would have the incidental advantage that by then most d.c. supplies would be changed to a.c. In the meantime, Mr. L. W. Joynson-Hicks, Parliamentary Secretary to the Ministry of Fuel and Power suggested, most old meters would be running slowly.

Consultative Council Representatives

Mr. Shinwell asked about the appointment of representatives of some Easington districts on the N.W.E.B. consultative council, alleging constant complaints about defects in electricity supply, but Mr. Lloyd pointed out that the Electricity Act made no provision for the appointment of representatives of limited areas.

Hire Purchase

On Tuesday of last week Mr. Maudling asked the Chancellor of the Exchequer if his requests to restrict the provision of hire-purchase facilities applied equally to business conducted by the nationalised gas and electricity industries. Mr. Boyd-Carpenter replied, stating that there was no difference in the position in this respect of such industries and that of other sellers of goods.

Electricity in Mines

Replying to a question about new measures for promoting safety in mines, Mr. Geoffrey Lloyd included in a list measures to ensure that electrical gear of foreign manufacture is not used in flame-proof pits unless it has been modified so as to meet fully the British flame-proof standards.

Plant Cost

A question by Mr. Nabarro drew from the Minister of Fuel and Power the information that the cost of new power stations averaged about £60/kW in January.

Rural Supplies

Answering a question on supplies in rural Wales, the Minister of Agriculture said that the Minister of Fuel and Power hoped shortly to make a statement on the general position of electricity supplies in rural areas, and their dependence on available resources.

Opencast Mining

On Friday last Mr. Geoffrey Lloyd announced that the Government considered the time had come when responsibility for production of opencast coal should be transferred to the National Coal Board. The Board had agreed to take over operational and financial responsibility with respect from April 1, 1952.

Television Licences

Mr. Gammans, Assistant P.M.G., in a written answer, gave a statement of the principles on which the new television detection equipment worked. (See p. 268.)

Electric Supply News

Caithness

Electricity charges in the county was the subject of a discussion last week between Sir Hugh MacKenzie, deputy chairman of the North of Scotland Hydro-Electric Board, along with Mr. R. B. Anderson, Northern Area manager, and other board officials, and the County Council's administration and finance committee. The meeting followed correspondence between the council and the Board regarding the Board's revised scale for the introduction of electricity to Council houses, under which a capital charge of £1 per room for 10 years is proposed. This, the council felt, would make it impossible to introduce electricity to council houses. During the discussions, Mr. Anderson conceded that the capital charge would not be asked where the council made provision in the houses for cooking by electricity, except in a few isolated cases. It was pointed out that at present the Board was subsidising electricity supply in Caithness to the extent of over £30,000 per annum.

Eire

Last week saw the connection of the 55,000th consumer under the rural electrification scheme of the Eire Electricity Supply Board. To mark the occasion, the chairman of the Board, Mr. R. F. Browne, and other officials attended the switching-on ceremony at the Parish Hall at Kilsaran, Co. Louth. Mr. Browne said that the first consumer was in North Co. Dublin in January, 1947 In the first year, 433 miles of line were erected and there were 1,286 consumers. A steady increase in the work had been effected each year, and in 1951 a total of 2,512 miles of line were erected and 17,480 consumers connected. Taking the number of potential consumers, about one-quarter of the total work contemplated had been completed.

Reference to new projects contemplated by the Government were described by Mr. Lemass, Minister for Industry and Commerce, last week. Of special significance to Co. Mayo, he said, was the fact that its development opened up the prospect of using the Mayo bogs for power purposes. The development of the Crossmoina-Bellacorick area would be the first undertaken, in conjunction with the Electricity Supply Board plan to construct a power station there, which it was intended to bring into commission in 1956.

Meriden

Objections to a proposed third generating station at Hams Hall were expressed at a local inquiry last week conducted by the Ministry of Fuel. The Meriden R.D.C. objected to the scheme on the ground of increased emission of smoke, dust and grit, and the discharge of spray and fumes. Mr. B. Bliss, representing the B.E.A., said that the new "C" power station would largely replace the original "A" station, and would have much improved equipment for dealing with grit and dust. The efficiency of the new station should be so high that no more coal would be burnt than in the peak year of 1950, when it was 1,769,622 tons, but much more electricity would be produced. Mr. R. R. Maddock, chief generating engineer (construction) Midlands Division, said that if the new station were not built the deficiency of electric power in the area would be 127,000 kW in 1955-56, rising to 295,000 kW in 1958-59. He admitted that, even with the latest types of equipment, it was not possible to stop grit emission altogether, but at the new station they anticipated that 70% of the grit would be stopped at the first operation and 96% of the remainder at the second operation. Among other objectors were the Birmingham Co-operative Society and the Birmingham, Tame and Rea Drainage Board. The result of the inquiry will be announced in due course.

Northern Ireland

The Northern Ireland Government has issued a directive to the Electricity Board for N. Ireland to slow down the rural electrification drive. This step has been made necessary as part of the general U.K. cuts in capital expenditure. In 1950 and 1951 the Board completed such work to the value of £1,453,000, and further schemes costing more than £1,000,000 have been approved.

Power Station Consents

The B.E.A. has received the consent of the Ministry of Fuel and Power to the establishment of a new power station to be known as the Wakefield (new) generating station at the Yorkshire town, and to the extension of Dalmarnock generating station, Glasgow. The new Wakefield station, which will stand on a site of approximately 126 acres, is to have a capacity of 240 MW, comprising four 60 MW turbo-alternators and four 550 klb/hr boiler units. At Dalmarnock the extension consists of two 60 MW turbo-alternator sets and six 200 klb/hr boiler units.

South Wales

At the meeting of the Council for the Preservation of Rural Wales, last week, objection was also raised to a proposal by the British Electricity Authority to build a generating station in Monmouthshire involving the use of 200 acres. Alternative sites had been suggested.

LIGHTING SCHEMES

Barrow.—T.C. has applied for consent to borrow £2,600 for street lighting on the Ormsgill Estate.

Bexhill.—T.C. is considering a scheme for illuminations at Egerton Park and floodlighting of the clock tower at a cost of about £800.

Boldon.—M.o.H. and L.G. has approved the U.D.C.'s estimate at £1,266 for providing 43 lights in Station Road, West Boldon and Cleadon Lane.

Letchworth.—A request is to be made to the M.o.T. to sanction a modified form of street lighting, thus enabling the Council to carry out

improved street lighting over a larger number of traffic routes until such time as they are in a financial position to comply with the Group A lighting standard laid down by the Ministry for traffic routes.

Padiham.—Sanction has been given to the borrowing of £2,410 for improved street lighting.

Peterborough.—T.C. is applying for consent to borrow £4,266 for street lighting in Crown Street, Eastfield and Welland Close Estates, Mounsteven Estate and part of Eastfield Estate.

Washington (Co. Durham).—U.D.C. surveyor is preparing a scheme for improving the area's street lighting.

Company Activities

Associated Electrical Industries

The proposed increase of the authorised capital from £10,000,000 to £18,000,000 by the creation of 5,000,000 additional ordinary shares of £1 each and 3,000,000 unclassified shares of £1 each was approved at an extraordinary general meeting in London last Thursday. Following the authorisation of this increase of capital 2,217,649 of the unissued Ordinary shares have been offered at 60s. a share to the holders of the existing Ordinary stock registered on January 21, in the proportion of one new share for every £3 of Ordinary stock then held.

Automatic Telephone and Electric Co.

An offer is shortly to be made to Ordinary and Deferred stockholders of 544,000 new £1 Ordinary shares at 45s. each on the basis of two new shares for each £5 of stock held on January 18. This issue will provide a gross sum of £1,224,000. The offer has been underwritten by Telephone and General Trust. Full details of the offer are being sent out tomorrow, February 8.

British Insulated Callender's Cables, Ltd.

Approval was given at last week's extraordinary general meeting to the resolution to increase the capital to £17½ millions by creating 5,000,000 additional £1 Ordinary shares. Subject to C.I.C. permission, the directors intend to make a rights offer to Ordinary holders "at a suitable time and price."

India Rubber, Gutta Percha and Telegraph Works Co.

A fixed Ordinary dividend of 6%, plus an extra 3%, making 9% has been declared for the year to September 30 last. On the Preferred Ordinary an extra 2% on the fixed dividend of 6% is also proposed. Similar distributions were made for the previous year. The group net profit last year, after taxation, was £184,080 (*£128,541*). Taxation absorbs £198,999 (*£31,908*).

Marco Refrigerators, Ltd.

The consolidated trading profit, etc., for the year to September 30 last was £36,584 (*£40,200*). After charging depreciation of £5,442 (*£5,043*), fees and interest, the net profit is £29,035 (*£32,884*), before taxation of £17,634 (*£18,121*). Consolidated current assets are listed at £213,529 (*£190,438*), which includes stocks at £163,032 (*£126,154*). Current liabilities amount to £123,401 (*£99,900*) including creditors £44,332 (*£60,004*) and bank overdraft of £51,376 (*nil*). Although orders in hand show an increase on the corresponding period a year ago and every effort is being made to introduce a measure of diversification and to further improve distribution outlets, the general economic outlook discourages any inclination to optimistic forecasting, states Mr. A. E. Leach, the chairman, and the uncertainties of the immediate prospects of iron and steel supplies render the future position unpredictable, but not without reasonable hope of improvement, he adds.

Dividends Declared

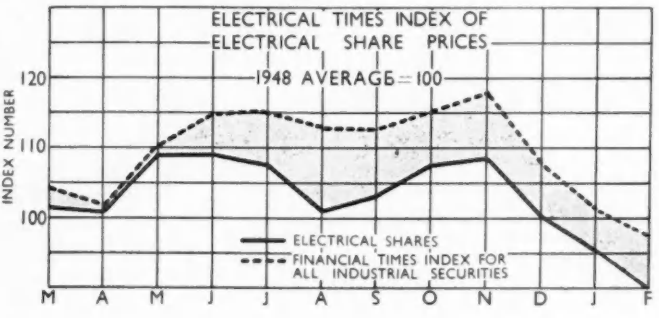
Electrical Components Ltd.—Interim of 7½% (*same*), payable on March 7.

Manx Electric Railway.—There is again to be no dividend for the year September 30. A meeting of 4½% debenture stockholders is being called to agree to postponement of debenture interest payment on April 1 next and certain subsequent dates.

Morgan Crucible Co. Ltd.—Interim dividend of 3¾% (*same*).

Scottish Cables.—Interim of 10% (*same*), but on enlarged capital.

The fall in share prices which began some three months ago continued during January. Latest figures show an almost identical drop by both electrical and all industrial shares. The "Electrical Times" index for the former fell by 6.3 to 89.4 while the "Financial Times" index for all industrial shares dropped from 103.6 to 97.6. Figures are based on average prices prevailing during 1948


ELECTRICAL TIMES INDEX OF ELECTRICAL SHARE PRICES
1948 AVERAGE = 100
INDEX NUMBER
120
110
100
ELECTRICAL SHARES
FINANCIAL TIMES INDEX FOR ALL INDUSTRIAL SECURITIES
M A M J J A S O N D J F

Commercial Information

CONTRACTS OPEN

HOME

Feb. 8. Manchester. Electrical installation at Hawthornden, Palatine Rd. City Architect, Town Hall. Deposit £1 1s.

Feb. 8.—Runcorn U.D.C. Supply of electric lamps required for year ending Mar. 31, 1953. T. J. Lewis, Clerk of the Council, Town Hall.

Feb. 9.—Bath. Supply of electrical and other fittings, lamps and time switches for street lighting. City Engineer, Guildhall.

Feb. 9.—Bedworth U.D.C. Provision and erection of 103 reinforced concrete lamp columns with 80 W mercury lamps and all equipment. Engineer and Surveyor to Council, 134 Neston Rd. Deposit £3 3s. (See Jan. 24 issue.)

Feb. 9.—Down. Installation of lighting and power circuits and fire alarm system at St. Leonards West, Warrenpoint. D. W. Bell, 41 Royal Ave., Belfast. Deposit £3 3s.

Feb. 9.—Halifax T.C. Re-electrification of Haugh Shaw primary school. Borough Engineer, Crossley Street. Deposit £2 2s.

Feb. 9.—Loughborough T.C. Supply of 185 25 ft. reinforced concrete columns. W. Granger, Borough Surveyor, Southfields, Loughborough. Deposit £1 1s.

Feb. 9.—Swansea T.C. Lamps for public lighting and lamp pillars included in list of supplies wanted by year beginning April 1. Borough Engineer and Surveyor, Guildhall.

Feb. 11.—Bath. Electrical installation in Julian Rd. flats. Architects are Hugh Roberts and Davies, 7 Brock St. Deposit £1 1s.

Feb. 11.—Buxton T.C. Supply and installation of (a) 12 lanterns, MAF/V 400 W lamps, control gear and concrete columns for Group A lighting along London Rd.; and (b) 24 lanterns, MBF/V 80 W lamps swan-neck pillar mounting conversion brackets with control gear for Group B lighting along three roads. Borough Engineer, Town Hall. Deposit £2 2s. (See Jan. 24 issue.)

Feb. 11.—N. Ireland. Ulster Transport Authority requires supplies of steel conduit and fittings for electrical wiring, lamps, cables and flexibles and electrodes during 12 months beginning Apr. 1. Stores Superintendent, Duncrue St., Belfast. Charge 1s.

Feb. 11.—Staffordshire. Electrical repairs and installations in S.W. Division, comprising districts of Brierley Hill, Coseley, Rowley Regis, Sedgley and Tipton. Applications, stating district(s), to Divisional Education Officer, 25 St. James's Rd., Dudley, Worc.—not required from contractors already on list.

Feb. 11.—Stalybridge, Hyde, Mossley & Dukinfield T. & E.B. Installation of electric light and power for new bus garage. Architects, Howard and Benson, 88 Mosley St., Manchester 2. Deposit £2 2s.

Feb. 11.—West Riding. Installation of electricity at Goole and Pontefract Willow Park schools. County Architect, "Bishopgarth," Westfield Rd., Wakefield.

Feb. 12.—Bath. Supply and erection of twin electrically driven automatic pressure controlled centrifugal pumps. City and Waterworks Engineer, 8a Terrace Walk.

Feb. 12.—Bentley-with-Arksey (Yorks) U.D.C. Electrical installation in 18 bungalows at Scawthorpe. Surveyor, Council Offices, Cooke St. Deposit £2 2s.

Feb. 12.—Dewsbury T.C. Electrical work in erection of Lee estate Hostel. Borough Architect and Buildings Surveyor, Town Hall.

Feb. 13.—Huddersfield T.C. Supply of materials for 12 months ending Mar. 31, 1953, includes tungsten filament, mercury vapour and sodium lamps. Borough Engineer and Surveyor, High St. Buildings.

Feb. 14.—Merthyr Tydfil T.C. Electrical installations at Pentrebach infants', Edwardsville junior mixed, Woodlands, Brecon Rd. infants' and Merthyr R.C. schools. Also the same at Caedraw junior mixed, Queens Rd., Pant and Dowlais infants' schools. These are separate contracts and deposit in each case is £2 2s. Borough Engineer's Dept., Town Hall. (See Jan. 17 issue.)

Feb. 14.—Sale T.C. Wiring and installation of electric lighting and power points in 70 dwellings on Baguley Lane estate. Borough Surveyor, Town Hall. Deposit £2 2s.

Feb. 15.—Aberdeen. Electrical work in erection of food warehouse at Greenbank Rd., Tullos, for Kraft Foods Ltd., Hayes, Middx. Architect is R. Meldrum, 5 E. Craibstone St., Aberdeen.

Feb. 15.—Belfast. Supply and erection of bulldozer with capacity of 120 tons coal per hour, minimum h.p. of 100 for engine, for Victoria power station Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Jan. 17 issue.)

Feb. 15.—Castlebar (Mayo). Electrical installation in County Clinic. E. R. Ryan, consulting engineer, 1 Montpellier Terrace, Galway. Deposit £10 10s.

Feb. 15.—Fife. Electrical work in erection of eight houses at Grange of Lindores. Surveyors are C. R. Douglas and Co., 15 East Port, Dunfermline.

Feb. 15.—Lowestoft T.C. Electrical installation to new laboratory at grammar school in Yarmouth Rd. Borough Engineer's Dept., Town Hall. Deposit £1 1s.

Feb. 15.—Sheffield. Electrical installation in secondary school for girls at Hurlfield. W. Geo. Davies, City Architect, Town Hall. Deposit £2.

Feb. 16.—Edinburgh. Maintenance contracts include electrical services to Western, Northern and Eastern General Hospitals and Musselburgh Maternity Hospital, during year beginning April 1. J. M. Horne, secretary and treasurer to Board of Management, Northern General Hospital, Ferry Rd., Edinburgh.

Feb. 16.—Enfield. Group Hospital Management Committee require supply of electric lamps for year beginning April 20. Supplies Officer, Chase Farm Hospital.

Feb. 16.—Harpenden U.D.C. Erection of 40 reinforced concrete columns with lanterns in Class B. Engineer and Surveyor, Harpenden Hall. Deposit £1 1s.

Feb. 18.—Bury St. Edmunds T.C. Inspection and maintenance of electrical equipment and installations in houses on Mildenhall Rd. estate. Borough Engineer and Surveyor, Borough Offices, Angel Hill.

Feb. 18.—Gravesend T.C. Rewiring of Municipal Offices and supply of certain electrical equipment. Borough Engineer and Surveyor, 6 Woodville Terrace, Gravesend. Deposit £1 1s. (Advertised in this issue.)

Feb. 18.—King's Lynn T.C. Supply of electric lamps for year ending March 31, 1953. Borough Engineer, H. G. Ridler, 27 Queen Street.

Feb. 18.—Manchester. Electrical installation at "Barfield" and "Southernhey," West Didsbury. City Architect, Town Hall. Deposit £1 1s. (See Jan. 31 issue.)

Feb. 18.—Stainforth (Yorks). Installation of lighting and power pointing in cemetery chapel. T. Brennan, clerk to Parish Council, 18 Kenneth Ave.

Feb. 19.—East Riding. Supply of electric lamps required. Supplies Officer, County Hall, Beverley.

Feb. 19.—Poole T.C. List of supplies for year ending Mar. 31, 1953, includes electric lamps, cables, fittings, water heaters, control units, street lighting lanterns, concrete columns, electric conduit and wiring accessories. J. R. Barron, Borough Engineer and Surveyor, Municipal Bldgs.

Feb. 20.—Keighley T.C. Supply and erection of 29 reinforced concrete columns with lanterns to Class B lighting standard on Calver Ave. estate. Borough Engineer, College Street.

Feb. 22.—Sunderland. Electrical installation at St. Cuthberts junior and infants' school, Grindon. Architects, Matkin and Hawkins, Barclays Bank Chambers, Fawcett St. Deposit £1 1s.

Feb. 25.—Bathgate T.C. Installation of fluorescent and sodium lighting along main roads and shopping streets. Burgh Surveyor, 2 George Place, Bathgate.

Feb. 25—Fife Electrical installation in extension to Buckhaven mining school. Quantity Surveyors are James Gentles and Son, Central Chambers, Kirkcaldy.

Feb. 25—Gateshead T.C. Electrical installation at St. Cuthbert's School in Derwentwater Rd. Chief Architect, Municipal Buildings, Swinburne St Deposit £2 2s. (Advertised in this issue).

Feb. 25.—Hastings T.C. Rewiring of electrical installation at Clive Vale secondary school. Borough Engineer, 37 Wellington Sq. Deposit £2 2s.

Feb. 25.—Herne Bay U.D.C. Supply and installation of two electrically-driven sewage pumping units each of 500 g.p.m. capacity, with switchgear, etc. W. W. Smith, Engineer and Surveyor, Council Offices. Deposit £2 2s.

Feb. 25.—Luton T.C. Tenders invited for effecting conversion to sodium lighting in several streets, including erection of concrete columns and fitting and wiring of lanterns and equipment. Borough Engineer's Office, Town Hall. Deposit £2 2s.

Feb. 25.—N. Ireland. Electrical work in erection of 82 dwellings at Carnmoney and 20 at Portavogie for N. Ireland Housing Trust. Trust is at 12 Hope St., Belfast. Deposit 10s. for each scheme.

Feb. 25.—Tynemouth T.C. Supplies required of electric lamps and cables, and lamp columns and reflectors for year ending March 31, 1953. Borough Surveyor, D. M. O'Herlihy, 16 Northumberland Square, North Shields.

Feb. 26.—Towcester (Northants) P.C. Supply and installation of 28 fluorescent street lighting units to Group A on trunk road A.5. A. E. G. Kemsley, Clerk of Council, 5 Burcote Way. (See Jan. 31 issue.)

Feb. 27.—Tynemouth T.C. Supply and erection of four electrically operated pumping units, each of 1,300 g.p.m., at Mitford. Water Engineer and Manager, 8 Northumberland Sq., North Shields. Deposit £3 3s.

Feb. 28.—Dewsbury T.C. Supply of electric lamps, cable, lanterns, lighting columns. C. H. Midson, Street Lighting Engineer, 27 Baltye St. (See Jan. 24 issue.)

Feb 29—Liverpool Supply of two 40-ton six-coupled diesel locomotives to Kirkby trading estate. City Engineer and Surveyor, Municipal Buildings, Dale St.

Mar. 1.—Bridgwater T.C. Supply and installation of two electrically driven pumps. Borough Engineer, Town Hall. Deposit £2 2s.

Mar. 1.—Dundalk U.D.C. Supply and installation of certain sewage pumping machinery,

Your Queries — Answered

"Dickrope" belting, makers of? C.M.—R. and J. Dick Ltd., Greenhead, Glasgow S.E. (22063)

Marine type push-button operated, spring return switch for operating a watertight door, makers of? T.B.—J. Stone and Co. Ltd., 1a Cockspur St., S.W.1; Wm. McGeoch and Co. Ltd., 43 Berners St., W.1. (22103)

"Gregg" accessories, makers of? T.E.—Gregg Electrical Industries Ltd., 25a Albert St., Birmingham 4, but the ceiling rose patented by W. G. D. Gregg has been taken over by Ranton and Co. Ltd., 6 Commerce Rd., Brentford, Middx. (22089)

"Balta" fires, makers of? C. A. — Berridge Aircraft Ltd., Berridge Rd. West, Hyson Green, Nottingham. (22096)

"Brailsford" washboilers, makers of? T.B.—Brailsford Bros., Queens Rd., Barnsley. (22074)

"Maglow" fires, makers of? L.E.—Mabro and Co. Ltd., 113, Euston Rd., N.W.1. (22081)

"Duraplug" rubber plug, makers of? B.C.—W. W. Haffenden and Co. Ltd., Richborough Rubber Works, Sandwich, Kent. (22109)

The above are selected from questions we have answered this week. If you have a query, send it to us.

electric motors, switches, accessories, meter and ancillary equipment. J. A. Smyth, Town Clerk, Town Hall. Deposit £5 5s.

Mar. 1.—Irlam U.D.C. Supply of electric lamps wanted for year ending Mar. 31, 1953. Engineer and Surveyor, Council Offices.

Mar. 3.—Cheadle and Gatley U.D.C. Supply of concrete and cast iron lighting columns, lamps, lanterns, swan-neck brackets, and switching gear boxes for year ending Mar. 31, 1953. Duncan S. Graham, Engineer and Surveyor, Town Hall, Brentwood, Cheadle. (Advertised in this issue.)

Mar. 11.—East Riding. Installation of electrical services at Withernsea secondary school. Applications to County Architect, County Hall, Beverley. (See Jan. 24 issue.)

No date stated.—Kelso T.C. Electrical works in erection of 33 houses on Inchmyre site. Applications to J. Pennie, Town Clerk, Kelso.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

March 14.—South Africa. Municipality of Senekal, Orange Free State, invites tenders for supply of all material and erection to complete electricity change-over scheme: two 200 kW (or two 250 kW) diesel alternator units complete (contract No. 1/1952); one main h.t. and l.t. switchboard with connections and laying of cables, etc. (2/1952); two 50 kVA, two 100 kVA and three 250 kVA three-phase transformers 11,000/400/231 V 3/1952); reconversion of l.t. d.c. network to three-phase, four-wire a.c. network (4/1952); and provision and/or change of lighting and/or power connections as required (5/1952). Documents from Dr. J. K. Marais, Transvalia Building, 21 Steimens St., Braamfontein, Johannesburg

March 14.—Uruguay. Usinas Electricas y Telefonos del Estado requires supply of transformer substation equipment, including circuit-breakers, separators, disconnecting fuses and supporting insulators. B.o.T. (Ref. CRE 1005/52).*

March 31.—New Zealand. Supply of two 5,000 kVA, 3-phase, 50 c/s, voltage regulating transformers of outdoor type, oil immersed and naturally cooled, for Auckland Electric Power Board. B.o.T. (Ref. CRE 2791/52).*

April 5.—Egypt. State Railways invite tenders for electrification of railway between Cairo and Heldan. Contract includes supply and erection of overhead equipment, control room and four substations, electric trains and signals Documents from Egyptian Inspecting Engineer, 41 Tothill St, London S.W.1, at cost per set of £E30.

No date stated—Egypt. Supply, erection and maintenance of air conditioning and ventilation installation for H.E. power station at Aswan Dam. Documents obtainable from Consulting Engineers, of Egyptian Govt., Kennedy and Donkin, 12 Caxton St., London S.W.1, as from March 3. Fee £E10.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	170 0 0	152 0 0
" " " "English" quality ...	171 10 0	
Tin (99·99·75%) ... ...(Cash)	1002½-1004	—
" (3 months)	1002½-1004	—
ALUMINIUM, commercial purity (del.)	148 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

CONTRACTS PLACED

B.E.A. Six 320 k.lb/hr. boilers, Brighton 13, Babcock and Wilcox Ltd.; four 180 k.lb/hr. boilers, East Yelland, John Thompson Water Tube Boilers Ltd.; three 540 k.lb/hr. boilers, John Thompson Water Tube Boilers Ltd., and circulating water valves at Tilbury, J. Blakeborough and Sons Ltd.; generator and station transformers, Goldington, Hackbridge and Hewittic Co. Ltd.; condensing and feed heating plant, Thornhill, Vickers-Armstrongs Ltd.; three 550 k.lb/hr. boilers, Stella South, Clarke Chapman and Co. Ltd.; three 550 k.lb/hr. boilers, Stella North Clarke Chapman and Co. Ltd.; and three 305 k.lb/hr. boilers, Huncoat, Simon Carves Ltd.

Dunbarton. Provision, erection and wiring of 89 street lighting columns on trunk road A.82, Metropolitan-Vickers Electrical Co. Ltd., £4,324.

East Kilbride. Installation of electrical equipment at factory being built for Rolls-Royce Ltd. K. Kilpatrick and Son Ltd., £300,000.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

F. J. and N. K. Hillary. Partnership between Francis J. Hillary and Norman K. Hillary, trading under above name as electrical and radio engineers at King St., Mortimer, dissolved as from Jan. 1. Debts received and paid by F. J. Hillary who will continue business.

Wembley Electrical Appliances Ltd. Meetings of creditors and contributories to be held at Inveresk House, 346 Strand, W.C.2, on Feb. 11, at 11.30 a.m. and 12 noon respectively.

Electro Physical Laboratories (Renny and Wender) Ltd. Supplemental dividends of 4·45d. in £ payable at Official Receiver and Liquidator's Office, Inveresk House, 346 Strand, W.C.2, on Feb. 1 or on any subsequent day except Saturday.

BANKRUPTCY ACTS

Intended Dividends

Southampton. Lancelot E. Lawson, radio and electrical engineer, trading as Lawson's Radio at 1 Northam Rd., Six Dials, Southampton. Last day for receiving proofs, Feb. 12. Trustee is N. G. Randall, 100 Park St., Grosvenor Sq., W.1.

Companies Winding-up

British American Industries Ltd., Common Road, Stanmore, Middx. First meeting of creditors held on Jan. 31. Business was entirely connected with trading in and manufacturing radio parts and electrical equipment and deaf-aid machinery, gramophone pick-ups, etc. No statement of affairs had been filed but liabilities were estimated at £1,430. There were no known realisable assets. Resolution passed for appointment of Mr. F. A. Cooper, 21 Copthall Avenue, London E.C.2, as Liquidator.

BUSINESS PROSPECTS

HOME

Ashby (Leics.) R.D.C. Fifty houses to be built on Ravenslea estate.

Ayr T.C. Dean of Guild Court has granted warrants to Henry Sutton Ltd. for alteration of buildings in Falkland Rd. to be used as fish-canning factory; and to Wallacetown Engineering Co. Ltd. for extension to their switchgear shop.

Ballymena R.D.C. Plans approved for housing scheme at Cullybackey, comprising 90 houses and six additional houses for old people.

Basford (Notts) U.D.C. Erection of 156 houses at Calverton, 140 at Nuthall and 54 at Kimberley. Council's Engineer, Surveyor and Housing Architect, J. J. G. Ellis, Rock House, Stockhill Lane.

Birmingham. Construction of 96 flats in Francis St. and 18 in Windsor St. H. J. Manzoni, City Engineer and Surveyor, Civic Centre.

Blackpool T.C. It is proposed to build two secondary technical schools and two R.C. secondary schools near Grange Park estate, two secondary schools in Stanley school area, a new grammar school in Toronto Ave., and a technical or county college also in Toronto Ave.

Brighton T.C. Erection of 72 flats in Lewes Rd. Also construction of 24 flats on Sylvan Hall estate. Borough Engineer and Surveyor, 26-30 King's Rd., Brighton, in each case.

Cardiff. A four-storey municipal office building is to be built in Bridge St. at estimated cost of £35,000.

Chelmsford T.C. Erection of 56 houses in eleven blocks on Chignall estate. Borough Engineer, Surveyor and Architect, Municipal Offices. R.D.C. is inviting tenders for erection of 42 houses at S. Hanningfield. Estates Manager, Council Offices, New London Road.

Chesterfield R.D.C. Tenders to be invited for erection of 168 houses for miners. Council Architect, Council Offices.

Clogher (Tyrone) R.D.C. Application to be made for sanction to borrow £31,000 for construction of 31 houses on various sites. Council also proposes to build 34 houses at Fivemiletown, 31 at Ballygawley, 20 at Aughnacloy and 18 at Clogher.

Coulsdon and Purley U.D.C. Plans approved for construction of 34 houses adjoining Coulsdon North station.

Darlington T.C. Tenders to be obtained for erection of 170 houses. Borough Architect is E. A. Tornbohm.

Derbyshire. This year's building programme includes extensions to Heanor Technical College, first instalment of Clowne College of Further Education and two infants' schools. Secondary Modern and grammar schools also to be built.

Dublin. Construction of 60 houses on Baldoyle site. Engineer's Office, 6 Parnell Square.

Hampshire. General contractors' work for erection of school of arts and crafts, Winchester. County Architect, The Castle, Winchester.

Harpenden R.D.C. Construction of 22 houses on Batford (North) estate. F. A. Harris, clerk, Harpenden Hall.

Hornchurch U.D.C. Construction of 56 dwellings. Engineer and Surveyor, Council Offices.

Hornsey T.C. Erection of 16 flats in two blocks and six in one block on three sites. G. A. Pentecost, Borough Engineer and Surveyor.

Huyton - with - Roby (Lancs). U.D.C. Sanction to borrow £49,128 is being sought for erection of 36 houses on St. John's Rd. East estate.

Hyde T.C. Erection of 50 houses on Cheetham Fold estate and eight on Harbour Farm estate. Borough Engineer, Municipal Buildings, Greenfield Street.

Ilkeston T.C. Construction of 24 houses on Kirk Hallam estate. A. O. Marshall, Borough Engineer and Surveyor, Town Hall.

Kettering T.C. Erection of 42 houses on Grange estate. J. Patrick Haugh, Borough Engineer and Surveyor, 3 Gold St.

Lisburn. Erection of eight shops, 26 flats, 20 maisonettes and six bungalows on Tonagh estate. N. Ireland Housing Trust, 12 Hope St., Belfast.

Middlesbrough. Erection of an R.C. primary school in Cargo Fleet Lane for Diocesan Trustees. T. Crawford, architect, 80 Borough Rd.

Monmouthshire. Erection of county school at New Inn, near Pontypool. C. L. Jones, County Architect, Queen's Hill, Newport.

Perth T.C. Application to be made for sanction to borrow £25,308 for erection of shops and houses at Moncreiffe.

Preston T.C. Erection of 90 houses on Larches estate. Borough Engineer and Surveyor.

Reading. Plans approved for the Mid-West secondary boys' school, estimated to cost £194,500.

Richmond (Yorks) R.D.C. Fourteen houses to be built at Colburn, eight at Tunstall, six at Aldbrough St. John and four at Ravensworth.

Romford T.C. Ministry has approved scheme for redevelopment of Crow Lane industrial site. Tenders probably be invited soon for erection of 451 houses on Cross Rd. site (part II).

Sheffield. Plans have been approved for first three development schemes on new Hackenthorpe estate to cover 1,114 houses. Eventually 1,800 houses are to be built on the estate.

South Shields T.C. Construction of 40 houses in seven blocks in Simonside development area. Borough Engineer, Town Hall.

Torquay T.C. Erection of 36 flats in nine blocks on Sherwell Valley estate. Borough Engineer and Surveyor, Town Hall.

Truro R.D.C. Construction of 32 houses on six sites. J. H. Snelgrove, Council's Quantity Surveyor, 26 Coinagehall St., Helston.

OVERSEAS

Cuba. Mario Faget of Faget y Cia., Menocal 501, Havana, wants to obtain exclusive distributing agencies for U.K. manufactured radios and domestic electrical appliances. Supply in Havana is 110 V 60 c/s.

India. The M.B.R. Industries Ltd., 15 Sadar Thanar Rd., Delhi 6, are interested in obtaining Diesel engines, electric motors, generators, batteries and sundry other electrical goods.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Public Company

Venner Time Switches Ltd. Kingston By Pass Rd., New Malden, Surrey. Electrical, mechanical and general engineers, etc. Cap.: £100. Dirs.: A. A. Rowse, and J. M. Brooke.

A. and A. Ashworth (Electrical Contractors) Ltd., 180 Chadderton Rd., Oldham. To take over from Albert Ashworth business of electrical contractors and retailers carried on by him under his own name and as "Chadderton Radio and Electrical Services" at 180 Chadderton Rd., Oldham. Nom. cap.: £2,000. Dirs.: A. Ashworth and Amy Ashworth.

Electro Sales (Uxbridge) Ltd. Honeycroft, Cleveland Rd., Cowley, Middx. Electrical equipment specialists, etc. Cap.: £1,000. Dirs.: E. A. H. Cross and M. C. Bignell.

Electromode Domestic Appliances Ltd., 275, Edgware Rd., Colindale, Mdx. Manufacturers of and dealers in domestic electrical appliances, etc. Cap.: £1,000. Dirs.: G. C. Paul and Mrs. E. H. C. Paul.

Express Ignition Co., Ltd., 35 Exchange St., Norwich. To take over (1) the business of an auto-electrical engineer carried on at 1 Anchor Yard, Calvert St., Norwich, by Cecil F Kybird as "Express Ignition Company"; and (2) the auto-electrical department of the business of motor engineers carried on at 24 Magpie Rd., Norwich, by Geo. H. Diggins and Archibald J. Denny, as "Denny and Diggins." Cap.: £1,250. Permt. dirs.: C. F. Kybird and E. S. Couzens.

T. Finch and Son Ltd., 80 Bower Way, Cippenham, Bucks. Electrical and electronic engineers and contractors, etc. Cap.: £1,000. Dirs.: T. L. Finch, C. T. Finch and Alice B. Finch.

Green Brothers (Electrical) Ltd., 68 Manor Rd., Brackley, Northants. To take over business of electrical engineers and contractors carried on at Brackley, by John G. Green and Peter F. Green. Cap.: £2,000. Dirs.: J. G. Green and P. F. Green.

Mica Process Co. (Manchester) Ltd., Cross St., off Linby St., Hulme, Manchester 15. Manufacturers of electrical insulating materials and of mica and micanite products, etc. Cap.: £5,000. Dirs.: C. Cash, Mrs. S. A. Cash and Gladys M. Coghill.

Mid-Century Microwavegear Ltd., 36 Hill Rd., Wimbledon, S.W.19. Manufacturers of and dealers in electrical and electronic equipment, etc. Cap.: £1,500. Dirs.: G. H. Berry and C. W. Wadlow.

Stokes (Electrical Contractors) Ltd. Offices of W. D. Burlinson and Co., 23 Park Row, Leeds 1. Cap.: £2,000. Permt. dirs.: A. Moody, E. N. Hirst and C. G. Stokes.

Victor Safety Irons Ltd., 39 Ridinghouse St., W.1. To take over from Maurice and Henry Victor, develop and turn to act Letters patent relating to electric irons, and to manufacture and deal in articles incorporating such invention, etc. Nom. cap.: £100. Dirs.: M. Victor, H. Victor and H. W. Hughes.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Curfew. 702,754. Class 7. Incubators, brooders, egg-washing machines. Curfew Appliances Ltd., The Otter Barn, Cross Roads, Ottershaw, Surrey.

Falco. 699,535. Class 9. Electrically operated lighters for smokers. L. C. Hillier Ltd., Oldham Rd., Rochdale, Lancs.

Magnicon. 697,906. Class 9. Pick-up tubes, iconoscopes, monoscopes and image-converter tubes, etc. Cath-Odeon Ltd., Medowcroft Laboratories, Church St., Cambridge.

Seamec. 703,710. Class 9. Electrodes for arc welding. Fusarc Ltd., Bridgewater House, Cleveland Row, St. James, S.W.1.

Signaflex. 702,405. Class 9. Electrical signalling apparatus for public service vehicles. D. H. Bonnella and Son Ltd., 46/48 Osnaburgh St., Euston Rd., N.W.1.

TRADE NOTES

New Phone No. The telephone number of the Hotpoint Electric Appliance Co. Ltd. and the International Refrigerator Co. Ltd. at Fletton, Peterborough, has been changed to Peterborough 5351.

New Depot. Stotts of Oldham have opened a new depot at 14 John St., Bristol (telephone Bristol 24908), which is under the management of Mr. A. W. Teall.

Metal Prices. As from Feb. 1 the price of imported soft pig lead was reduced by £5 to £170 per ton delivered. From the same date, the price of virgin magnesium ingots was increased by 6d. to 2s. 10½d. per lb, delivered.

Birmingham Office. E.L.M.A. Lighting Service Bureau have now opened a new Central England area office at 111 New Street, Birmingham 2, from which Mr. F. Jamieson is now operating, instead of from his Leicester address.

Change of Address. The Manchester office of Dewrance and Co. Ltd. has been transferred to 32 Deansgate, Manchester 3. Telephone Blackfriars 9283. Mr. Duckworth is the company's manager for the area.

MEETINGS TO NOTE

THURSDAY, FEB. 7

WORCESTER ELECTRIC CLUB.—"Stage Lighting." E. E. Faraday. To be held at Archdales.

I.E.S. (Nottingham Centre).—"Illumination of a Medium Size Factory." W. K. Martin. E. Midlands Elect. Board, Smithy Row, 5.30 p.m.

I.E.E. (London).—"Economics of Low-Voltage Electricity Supplies to New Housing Estates." F. G. Copland. Savoy Place, 5.30 p.m.

A.S.E.E. (S. London Branch).—"General Installation Work in Large Blocks of Flats." J. W. Quelch, Cafe Royal, Croydon, 8 p.m.

FRIDAY, FEB. 8

JNR. INSTN. OF ENGINEERS.—"Modern Submarine Cables." E. A. Applebee. 39 Victoria St., S.W.1., 6.30 p.m.

E.P.E.A.(N. Meter and Instruments Tech. Group).—"Current and Voltage Transformer Testing and Remote Metering or Indication." G. F. Shotter. Y.E.B., Whitehall Rd., Leeds, 6.30 p.m.

MANCHESTER ASSOC. OF ENGRS.—Annual lecture. College of Technology. Prof. F. C. Williams.

I.E.S. (Birmingham Centre).—"Industrial Lighting." E. H. Norgrove. Imperial Hotel, 6 p.m.

I.E.E. (N.E. Centre).—Annual dinner at Old Assembly Rooms, Newcastle, 7.15 p.m.

A.S.E.E. (Bristol Branch).—"Automobile Welding Repairs." A. Gilliard. Grand Hotel, 7.30 p.m.

A.S.E.E. (Crewe Branch).—"Industrial Lighting." V. Heydon. Copeland Arms Hotel, Glebe St., Stoke, 7.30 p.m.

A.S.E.E. (Liverpool Branch).—"Distinguished Company." Service Centre, Whitechapel, 7.30 p.m.

E.P.E.A. (S. Meter Engrs.' Group).—"Rapid Method of Calibrating Single-phase Integrating Meters." S. Wrigley. Caxton Hall, S.W.1, 6.30 p.m.

MONDAY, FEB. 11

I.E.E. (London).—Discussion on "Merit Rating and Job Evaluation." J. J. Gracie. Savoy Place, W.C.2, 5.30 p.m.

I.E.E.—Faraday lecture on "Sound Recording—Home, Professional, Industrial and Scientific Applications." G. F. Dutton. Central Hall, Westminster, 6.30 p.m.

I.E.E. (N.E. Centre).—"Domestic Electrical Installations—Some Safety Aspects." H. W. Swann. Neville Hall, Westgate Rd., Newcastle, 6.15 p.m.

I.E.E. (S. Midland Supply and Utilisation Group).—"Modern Developments in Electric Welding." H. G. Taylor. G.E.C. Telephone Works, Coventry, 6.30 p.m.

I.E.E. (Western Centre).—"Sutton Coldfield TV Station." P. A. T. Bevan and H. Page. S. Wales Inst. of Engrs., Park Place, Cardiff, 6 p.m.

I.E.E. (Reading).—"Applications of Electronic Beams." M. E. Haine. George Hotel, King St., 7 p.m.

A.S.E.E. (Central London Branch). "Supervising Remote Control of Electrical Supplies." J. D. McNeil. St. Ermin's Hotel, Caxton St., 7 p.m.

A.S.E.E. (N.W. London Branch).—"Corrosion." G. E. D. Redman. Prince of Wales Hotel, 7.45 p.m.

TUESDAY, FEB. 12

E.P.E.A. (Midland Tech. Group).—"Superimposed Frequency Control Systems." J. F. McKenzie. At Worcester, 7 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (S.W. Branch).—"District Heating in France." E. A. Pearce. R.W.A. School of Architecture, Bristol, 6.30 p.m.

I.E.S. (London).—"Specification and Testing of Fluorescent Lamp Fittings and Their Equipment." W. R. Bloxsidge, G. Fahey and D. T. Waigh. Royal Soc. of Arts, John Adam St., W.C.2, 6 p.m.

I.E.S. (Cardiff Centre).—"Development of Tungsten Lamp." B. P. Dunning. S. Wales Elect. Board, 5.45 p.m.

I.E.E. (E. Midland Centre).—"Domestic Electrical Installations—Some Safety Aspects." H. W. Swann, E. Midland Service Centre, Derby, 6.30 p.m.

I.E.E. (N.W. Supply Group).—"Inhibited Transformer Oil," W. R. Stoker, and C. N. Thompson; "Stability of Oil in Transformers," P. W. L. Gossling and L. H. Welch. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

A.S.E.E. (S.W. London Branch).—"Electric Arc Welding." B. W. Silverwood. St. George's Hall, St. George's Rd., Wimbledon, 8.15 p.m.

A.S.E.E. (S.E. London Branch).—Annual J and P Lecture: "Atomic Physics." S.E. London Tech. College, 8 p.m.

NEWPORT ELECTRIC CLUB.—"Some Pioneers of Electrical Science." J. W. Elliott. Tredegar Arms Hotel, 7 p.m.

I.E.E. (N. Ireland Centre).—"Design and Performance of Surge Diverters for Protection of a.c. Systems." T. F. Monahan. Presbyterian Hotel, Howard St., Belfast, 6.45 p.m.

I.E.E. (Rugby sub-centre).—"Control of Hydro-Electric Plant." A. H. C. Frost and W. Brittlebank. College of Technology and Arts, 6.30 p.m.

POWER FARMING CONFERENCE.—Opens today at Harrogate, continuing until Thursday.

WEDNESDAY, FEB. 13

ROYAL SOC. OF ARTS.—"TV Technique as Aid to Observation." J. D. McGee. John Adam St., W.C.2, 2.30 p.m.

I.E.E. (London Students Section).—"Relaxation Methods and their Application to Field Problems." C. J. Carpenter. District meeting at Public Library, Chelmsford, 7 p.m.

BRITISH INSTN. OF RADIO ENGRS. (N.E. Section).—Symposium of papers by student members. Neville Hall, Westgate Rd., Newcastle, 6 p.m.

BRITISH INSTN. OF RADIO ENGRS. (S. Midlands Section).—"Gas Discharge Devices as Switching Elements." E. A. R. Peddle. Civic Rest, Corporation St., Coventry, 7.15 p.m.

BRADFORD IND. SAFETY & WELFARE ASSOC.—"Electrically Interlocked Guards." Fordham Cooper. Y.E.B., 45/53 Sunbridge Rd., 7.30 p.m.

I.E.S. (Edinburgh Centre).—"Outdoor Decorative Lighting." H. Carpenter. 357 High St., Edinburgh, 7 p.m.

I.E.E. (London Radio Group).—"Factors affecting Design of Automatic Electron Trajectory Tracer." K. F. Sander, C. W. Oatley and J. G. Yates. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Lancs. sub-centre).—"Electrical Installations in Large Chemical Factories." N.W.E.B., North Rd., Lancaster, 7 p.m.

I.E.E. (N. E. Scotland sub-centre).—"Protection of Electric Power Systems—Critical Review of present-day Practice and Recent Progress." H. Leyburn and C. H. W. Lackey. Caledonian Hotel, Aberdeen, 7.30 p.m.

I.E.E. (Scottish Centre).—"London - Birmingham TV Radio - Relay Link." R. J. Clayton, D. C. Espley, G. W. S. Griffiths and J. M. C. Pinkham. Heriot-Watt College, Edinburgh, 7 p.m.

I.E.E. (Southern Centre).—"Grain Drying in Electricity." W. Cover. Polygon Hotel, Southampton, 6.30 p.m.

I.E.E. (Oxford).—"Application of Gas Turbines to Electricity Supply." E. B. Johnson. S.E.B., 37 George St., 7 p.m.

A.S.E.E. (Bradford Branch).—"Factory Maintenance Methods." J. W. White. Midland Hotel, 7.30 p.m.

THURSDAY, FEB. 14

INCORP. PLANT ENGRS. (Kent Branch).—"Utilisation of Refrigeration in War." Queens Head Hotel, Maidstone, 7 p.m.

E.P.E.A. (Merseyside Tech. Group).—"SwitchgearDevelopment." J.A.F. Harvey, Elect. Showroom, Whitechapel, Liverpool, 7 p.m.

E.P.E.A. (W. Yorks. Tech. Group).—"Turbo-Jet Propulsion." N. R. Chandler. Y.E.B., Whitehall Rd., Leeds, 6.45 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—Clerk-Maxwell Memorial Lecture by Prof. G. W. O. Howe, The University, Edinburgh, 7 p.m.

ENGINEERS' GUILD.—Debate on "Nationalisation of Industry does not adversely effect status of Professional Engineer." Caxton Hall, S.W.1, 6 p.m.

I.E.S. (Glasgow Centre).—"Brightness Engineering." W. Robinson. 39 Elmbank Cres., Glasgow, 6.30 p.m.

I.E.S. (Leicester Centre).—"Lighting of the *Queen Elizabeth and Caronia*." T. Cotten. E. Midlands Elect. Board, Charles St., 6.30 p.m.

I.E.S. (Manchester Centre).—"Lighting and Vision in Advancing Age." H. C. Weston. Town Hall Extension, 6 p.m.

I.E.E. (E. Midland Centre).—"Modern Developments in Electric Welding." District meeting at George Hotel, Kettering, 7.30 p.m.

I.E.E. (N.E. Scotland sub-centre).—"Protection of Electric Power Systems—Critical Review of present-day Practice and Recent Progress." H. Leyburn and C. H. W. Lackey. Royal Hotel, Dundee, 7 p.m.

I.E.E. (W. Wales sub-centre).—"Electrical Installations in Large Chemical Factories." D. B. Hogg. Central Public Library, Swansea, 6 p.m.

FRIDAY, FEB. 15

INSTN. OF MECHANICAL ENGRS.—"Allocation of Machines to Operators." T. F. O'Connor. Storey's Gate, S.W.1, 5.30 p.m.

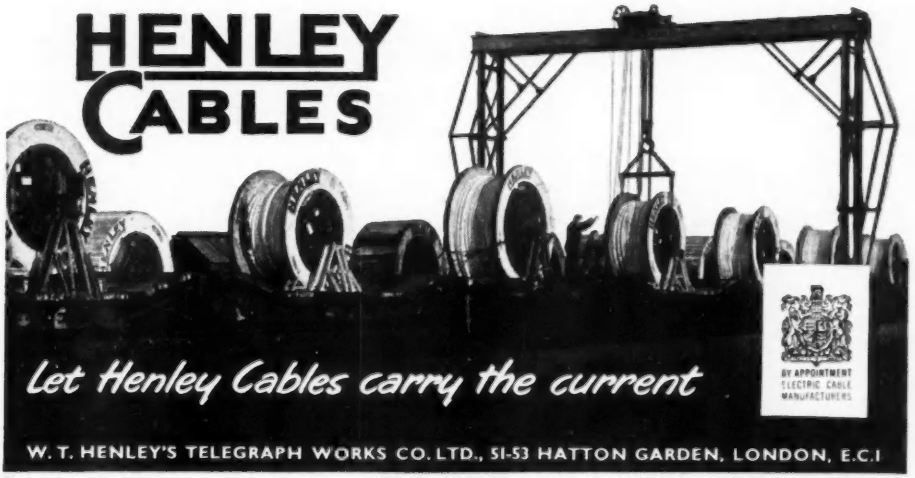
JNR. INSTN. OF ENGINEERS.—"Recent Developments in Arc Welding Electrodes." D. H. Young. 39 Victoria St., S.W.1, 6.30 p.m.

I.E.S. (Newcastle Centre).—Annual dinner and dance at County Hotel, 7 p.m.

I.E.E. (N. Ireland Centre).—Annual conversazione and visit of President. Grand Central Hall, Belfast, 6.45 p.m.

Henley's supplied and laid all the 33kV 3-core cables, and the 33kV single-core rectifier transformer cables, for Stage One of British Railways Manchester-Sheffield-Wath electrification scheme.

The top picture shows a 583 yard length (the longest run on this stage) being laid through Oxspring tunnel, where restricted clearance did not permit jointing. Below, loading a construction train in Henley's Contract Depot at Penistone.



How round is perfectly round?

within $\frac{1}{40,000}$th of an inch

This illustration shows part of a testing machine capable of measuring the diameter of fine wires to one millionth part of an inch. UNIFORM ROUNDNESS is of the greatest importance in ensuring satisfactory performance and the very fine 15W filament wire has to be accurate to one forty thousandth of an inch. The slender yet accurate filaments in electric lamps have to maintain their shape even when heated to temperatures around 2500°C. QUALITY CONTROL rigorously applied throughout manufacture ensures uniform excellence.

METROVICK LAMPS

Quality control - throughout

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., ST. PAUL'S CORNER, 1-3 ST. PAUL'S CHURCHYARD, LONDON E.C.4

Member of the A.E.I. group of companies

S/F201

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CHEADLE AND GATLEY URBAN DISTRICT COUNCIL

TENDERS FOR STREET LIGHTING STORES

TENDERS are invited for the supply of the undermentioned materials for the year ending March 31, 1953:—

CONCRETE LIGHTING COLUMNS
CAST IRON LIGHTING COLUMNS
ELECTRIC LAMPS
LANTERNS
SWAN-NECK BRACKETS
SWITCHING GEAR BOXES

Specifications and forms of tender may be obtained from Mr. Duncan S. Graham, Engineer and Surveyor, Town Hall, Bruntwood, Cheadle, Cheshire.

Tenders, in plain envelopes, duly sealed and endorsed "Tenders—Street Lighting Stores," to be delivered to the undersigned not later than 10 a.m. on Monday, March 3, 1952.

The Council do not bind themselves to accept the lowest or any tender.

W. TIMPERLEY,
Clerk to the Council.

Town Hall, Bruntwood,
Cheadle, Cheshire.
February 1, 1952. (R 42)

GRAVESEND BOROUGH COUNCIL

ELECTRICAL INSTALLATION AT MUNICIPAL OFFICES

TENDERS are invited for the re-wiring of the Municipal Offices, and for the supply of certain electrical equipment.

The works will be executed under the direction of the Corporation's Consulting Electrical Engineers, Messrs. Read and McDermott, Rochester.

Specification and form of tender may be obtained from, and the general conditions and plans inspected at the office of the Borough Engineer and Surveyor, 6 Woodville Terrace, Gravesend, on receipt of a returnable deposit of one guinea.

The Corporation does not bind itself to accept the lowest or any tender.

Tenders should be returned to the undersigned not later than Monday, February 18, 1952.

F. W. HARRISON,
Town Clerk.

4 Woodville Terrace,
Gravesend. (R 41)

BOROUGH OF BURY ST. EDMUNDS

MAINTENANCE OF ELECTRICAL EQUIPMENT AND INSTALLATIONS

TENDERS are invited for the INSPECTION AND MAINTENANCE of electrical equipment and electrical installations in Council Houses on the Mildenhall Road Estate.

Tenders should include for an annual inspection of the electrical installations, and should be at a rate "per house," in order that houses handed over in the future may be included. The total number of houses at present occupied on the estate is 492. They should also include for six monthly inspections of electrical equipment as per lists which may be inspected in the Borough Engineer's Office; (216 houses are at present affected), and should allow for the replacement of defective parts (to be charged at current rates), all other charges to be included within the tender price again "per house."

The Council do not bind themselves to accept the lowest or any tender.

Tenders should be delivered in a sealed envelope en-

(Continued in next column)

(Continued from previous column)

dorsed "Maintenance of electrical equipment," to the Borough Engineer and Surveyor, Borough Offices, Angel Hill, Bury St. Edmunds, not later than 12 noon, Monday, February 18, 1952.

NORMAN C. GOLDSMITH, M.B.E., M.I.Mun.E.,
Borough Engineer and Surveyor.

Borough Offices, Bury St. Edmunds.
January 23, 1952. (P 799)

COUNTY BOROUGH OF GATESHEAD

St. Cuthbert's Controlled School
Derwentwater Road, Gateshead

APPLICATIONS are invited from Contractors desirous of tendering for the ELECTRICAL INSTALLATION, namely lighting, to replace the existing gas installation at the above school.

Copies of drawings and specification and form of tender may be obtained and the general conditions of contract inspected at the Chief Architect's Department on deposit of two guineas, which will be refunded on receipt of a bona-fide tender or the return of the drawings and specification.

Applications to tender should be made to H. J. Cook, A.R.I.B.A., M.I.Struct.E., Chief Architect, Municipal Buildings, Swinburne Street, Gateshead, within seven days of this advertisement, and tenders returned to the undersigned on the official form in the endorsed envelope supplied by noon on Monday, February 25, 1952.

The lowest or any tender will not necessarily be accepted, nor will any allowance be made for estimates.

J. W. PORTER,
Town Clerk.

Town Hall, Gateshead 8.
January 31, 1952. (R 44)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

SENIOR ASSISTANT ENGINEER required to Generation Engineer (Construction).

Candidates should have experience in the design, layout and construction of new power stations or extensions to existing stations, and should possess the highest technical qualifications in Mechanical, Electrical or Civil Engineering.

Salary, £945 to £1,109 (N.J.B. Class "AX/BX," Grade 1). Appointment superannuable.

Apply by February 22, 1952, giving age and details of qualifications and experience, to Divisional Controller, British Electricity House, Portobello, Midlothian. (R 23)

LONDON ELECTRICITY BOARD

TECHNICAL ASSISTANT, DESIGN AND PLANNING BRANCH

APPLICATIONS are invited for the above position at Stratford, London E.15.

Applicants should have received a sound general and technical engineering training to Grad. I.E.E. standard, should have served an engineering apprenticeship with an electrical manufacturer or supply authority and should have some practical experience on distribution.

The post is graded under Schedule A of the National Joint Board Agreement as Class "K", Grade 13, £591 3s. per annum rising to £614 5s. per annum, inclusive of London Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned, completed, by February 18, 1952. Please enclose addressed envelope and quote ref. V/1399/T on all correspondence. (R 45)

CENTRAL ELECTRICITY BOARD
FEDERATION OF MALAYA

THERE are vacancies under the Central Electricity Board, Federation of Malaya, for the following technical staff:—

ELECTRICAL ENGINEERS

for Distribution; Meters and Protection; Hydro-Electric; and Mechanical Work

POWER STATION STAFF

Station Superintendent — **Power Station Chemist**

Assistant Station Superintendent — **Operation and Efficiency Engineer**

Turbine Room Superintendent

Appointments are for three years with good prospects thereafter of permanent appointment to the pensionable staff. Non-contributory pension scheme. SALARIES (including allowances) for the various posts are in scales ranging from £1,057 to £2,086 a year according to qualifications, war service and experience. Additional allowances payable to married men according to dependents.

Experienced candidates not eligible on age grounds for appointment with prospect of permanency can be considered for short-term contracts at higher initial salaries within the above-mentioned scales.

Officers on first appointment have the option of terminating their appointments at the end of one year if they so desire.

Applicants for any of the above vacancies are invited to write, giving brief particulars of age, qualifications and experience, to the Crown Agents for the Colonies (Dept. M.3B), 4 Millbank, London S.W.1. Further details of vacancies and an illustrated booklet describing conditions of service with the Board, housing, etc., will be sent to applicants who are selected for further consideration. (R 20p)

SOUTHERN RHODESIA GOVERNMENT EDUCATION DEPARTMENT

APPLICATIONS are invited from persons of British nationality for appointment to the Southern Rhodesia Teaching Service (Technical Schools) to teach ELECTRO-TECHNICS from Elementary to Higher National Certificate standards including ELECTRICAL CONSTRUCTION AND DRAWING and the elements of ELECTRICAL DESIGN.

Applicants should have served an apprenticeship in Electrical Engineering and possess works and drawing office experience. A B.Sc.(Engineering) in electrical subjects or an A.M.I.E.E. by examination is desirable.

The preferential age limits are 22-35, and a rigid medical examination must be passed.

Basic salary scale: £468 by £33 to £600 by £34 to £668 by £33 to £800 by £100 to £900 by £40 to £1,140.

Commencing salary is dependent on years of approved training and up to four increments may be granted for approved previous experience. The salary scale maximum varies according to years of approved training. At the moment a cost-of-living allowance of 27 per cent of basic salary is payable and also marriage and children's allowances. Preference will, however, be given to single men. Successful applicants will be expected to assume duty on July 1, 1952. Application forms and further information may be obtained from the Secretary, Rhodesia House, 429 Strand, London W.C.2, to whom completed forms should be returned not later than February 29, 1952.

(R 18)

EASTERN ELECTRICITY BOARD

APPOINTMENT OF SECRETARY

APPLICATIONS are invited from suitably qualified candidates for the post of Secretary to the Eastern Electricity Board.

The vacancy arises through the appointment of Mr. Arthur Bond, the present Secretary and Solicitor to the Board, to be Deputy Chairman of the Yorkshire Electricity Board.

The appointment is superannuable and the salary will be £2,750 a year.

Applications, to arrive not later than February 29, 1952, should be addressed to The Chairman, Eastern Electricity Board, Wherstead, Ipswich, Suffolk. (R 3)

WEST MIDLANDS GAS BOARD

ASSISTANT ELECTRICAL ENGINEER

APPLICATIONS are invited for the position of Assistant Electrical Engineer to the Board.

Candidates should be Corporate Members of the I.E.E., and have experience in heavy industrial electrification, including generation and distribution. A knowledge of preventive maintenance schemes and electronics would be an advantage.

The duties involve the supervision of maintenance, installation and development of electrical work associated with gaswork's processes having a total capacity of approximately 25,000 kVA.

The salary will be within the range of £720 to £1,150 per annum according to experience and qualifications. The successful candidate will be required to pass a medical examination, contribute to such scheme of superannuation as the Board may, in due course, adopt, and to reside in or near Birmingham.

Applications, stating age, education, training, qualifications and experience, together with the names of two referees should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6 Augustus Road, Edgbaston, Birmingham 15, to reach him within fifteen days of the appearance of this advertisement. When replying, applicants are requested to quote ref. E. T.

F. H. CURETON,
Secretary to the Board.

(R 17)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

STATION SHIFT CONTROL ENGINEER required at Stoke Generating Station. National Joint Board service conditions; superannuable appointment, commencing salary in accordance with Schedule "A," Class "E," Grade 10, £535 per annum.

Higher National Certificate in Electrical Engineering or equivalent qualification required, together with sound technical training and practical experience in the control and operation of steam generating plant and main switchgear.

Forms of application, available from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by February 23, 1952.

F. W. LAWTON,
Divisional Controller.

(R 4)

BOROUGH OF WILLESDEN

Borough Engineer and Surveyor's Department

APPOINTMENT OF CHIEF MECHANICAL AND ELECTRICAL ENGINEERING ASSISTANT

APPLICATIONS are invited for the appointment of Chief Mechanical and Electrical Engineering Assistant on the permanent staff of the Borough Engineer and Surveyor's Department. The salary attaching to the post will be within grades A.P.T. VII/VIII, namely, £715 to £840 per annum inclusive of London Weighting, the commencing salary being in accordance with the successful candidate's qualifications and experience.

Candidates must have passed one of the following examinations, namely:

1. The Associate Membership Examination of the Institution of Mechanical Engineers.
2. The Associate Membership Examination of the Institution of Electrical Engineers.
3. A British University Degree or Diploma in Mechanical or Electrical Engineering

and it will be deemed an additional qualification if any candidate holds the Higher National Certificate in Mechanical Engineering or Electrical Engineering, or has passed the Final Examination of the Institution of Heating and Ventilating Engineers.

Candidates should have some training and practical experience in mechanical engineering, particularly in the repair and maintenance of mechanical installations and electrical plant.

The successful candidate will be expected to take charge of the Mechanical and Electrical Sub-section of the Borough Engineer's Department. Full details of the staff employed in and the duties carried out by the Sub-section will be forwarded on application to the undersigned.

The foregoing appointment will be terminable by one month's notice on either side, is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

It will be necessary for the successful candidate to provide his own housing accommodation as the Council is not in a position to assist.

Applications, stating age, qualifications, experience, etc., accompanied by copies of not more than three testimonials, should be addressed to the undersigned, endorsed "Engineering Appointment," not later than 10 a.m. on Monday, February 25, 1952.

Canvassing, either directly or indirectly, will be deemed a disqualification.

R. S. FORSTER,
Town Clerk.

Town Hall, Dyne Road,
Kilburn, N.W.6.
January 23, 1952. (P 808)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF 2nd ASSISTANT ENGINEER (TELECOMMUNICATIONS AND TELECONTROL) CHIEF ENGINEER'S DEPARTMENT

CANDIDATES should have good knowledge of the application of automatic telephone equipment for communication and remote supervisory control, of radio communication technique, and of the use of carrier currents on extra high voltage overhead lines for control, communication and relaying purposes. Experience of protective relays used on large electrical systems will be an advantage.

Salary scale, £809 to £1,028 p.a., Grade AD DX2, N.J.B. conditions. Commencing salary between £809 and £945 per annum, depending upon qualifications and experience.

Applications, stating age, technical or scientific qualifications, experience, present post and salary, should be received by the Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, by February 16, 1952. (R 5)

MIDLANDS ELECTRICITY BOARD

APPOINTMENT OF GENERAL ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the above position in the Wellington District of the Shropshire and Herefordshire Sub-Area.

Applicants should have had experience in all branches of distribution work, including erection, operation and maintenance of high and low voltage cables, overhead and underground mains, substations, etc. Appropriate technical qualifications will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement, and the salary will be Class "E," Grade 11, £504 per annum.

Applications, stating age, experience and present position, should be forwarded within fourteen days to Mr. W. Winwood, Manager, Shropshire and Herefordshire Sub-Area, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
(R 2)

SOUTH EASTERN ELECTRICITY BOARD

MAINS FOREMAN—Tunbridge Wells District Wages 3s. 8½d. per hour for 44-hour, five-day week under N.J.I.C. Agreement. Applicants should have a wide experience of laying and jointing all classes of cable up to 11 kV. Applications received in response to the previous advertisement published November, 1951, will be reconsidered and need not be re-submitted. A flat may be available for the successful applicant.

Applications, giving two referees, must reach T. W. Dann, M.Eng., M.I.E.E., Tunbridge Wells Manager, SEEBoard, Town Hall, Tunbridge Wells, by February 18, 1952.

DISTRICT COMMERCIAL ENGINEER—Sutton District

Salary £825 to £862 p.a. under N.J.B. Schedule, Class "F," Grade 4, plus London weighting. Superannuation will be arranged. Applicants must have had extensive experience in the electricity supply industry, including the organisation and control of a Commercial Department, with a large contracting section, also experience in dealing with industrial consumers, tariffs, etc. Preference given to Corporate Members of the I.E.E. or equivalent qualifications.

Applications, on forms obtainable from C. W. Hughes, B.Sc., M.I.E.E., Surrey Manager, SEEBoard, Rough Rew, Horsham Road, Dorking, Surrey, to be returned by February 18, 1952.

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEERS—Dover and Folkestone Districts

Salary £645 to £668 p.a. under N.J.B. Schedule, Class "D," Grade 6. Superannuation will be arranged. Appropriate technical qualifications an advantage. Applicants must be experienced in the supervision and organisation of all installation and showroom work, the preparation of estimates for domestic, commercial and industrial installations, and have a sound knowledge of tariffs and be capable of developing agricultural load.

Applications, giving two referees, must reach H. F. Knell, J.P., M.I.E.E., Kent Manager, SEEBoard, 178-184 High Street, Rochester, by February 18, 1952.

A. L. BURNELL,
Secretary.
February, 1952. (R 24)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 8/52

APPLICATIONS are invited for the following superannuable appointments at salaries in accordance with the N.J.B. Agreement, Schedule "D."

1. SENIOR DRAUGHTSMAN (Electrical), Generation (Construction) Department. Grade 5 (£547 to £651).

2. ENGINEERING DRAUGHTSMAN (Mechanical) Generation (Construction) Department. Grade 6 (£413 to £547).

The successful applicants will be based at Newport Power Station. Preference will be given to candidates who hold the Higher National Certificate or equivalent, and they should have previous drawing office experience.

For appointment 1, a knowledge of electrical installations and layout will be an advantage, and for appointment 2, a similar knowledge of mechanical plant is required.

Application forms, obtainable from the Divisional Secretary at the address below, should be returned by February 19, 1952.

H. J. BENNETT,
Divisional Controller.

British Electricity Authority,
Cardiff (Pengam Moors) Airport,
Cardiff.
January 29, 1952. (R 22)

MIDLANDS ELECTRICITY BOARD

Birmingham and District Sub-Area

APPOINTMENT OF SECOND ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the position of Second Assistant District Engineer in the Solihull District of the Birmingham and District Sub-Area.

Applicants should have received a good general training in the electricity supply industry and have had experience in the operation and maintenance of high voltage and medium voltage underground and overhead networks and plant. Appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with National Joint Board conditions and the salary will be Grade "E.7," £629 to £660 per annum.

Applications, stating age, qualifications, experience, present position and salary, endorsed "Second Assistant District Engineer," should be forwarded within fourteen days to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.
(R 1)

NORTH EASTERN ELECTRICITY BOARD

York Sub-Area

APPLICATIONS are invited for the following appointments:—

SECOND ASSISTANT ENGINEER—Operation and Maintenance (Protection) Sub-Area Headquarters

Applicants should have had sound technical and practical training, preferably with an Engineering Degree and/or Corporate Membership of the Institution of Electrical Engineers. They should have experience of the installation, testing and commissioning of the protection of h.v. and l.v. distribution networks.

Salary scale, Schedule A, Class "G," Grade 7, £704 to £733 per annum. N.J.B. conditions of service.

SECOND ASSISTANT DISTRICT ENGINEER, Malton

Applicants should have had sound technical and practical training and considerable experience of the construction, operation and maintenance of underground and overhead h.v. and l.v. networks.

Salary scale, Schedule A, Class "C," Grade 7, £579 to £602 per annum. N.J.B. conditions of service.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary, Establishments, The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne 1, within ten days of the appearance of this advertisement.

January 30, 1952. (R 15)

DENBIGHSHIRE COUNTY COUNCIL

County Architect's Department (Wrexham)

APPLICATIONS are invited for the following appointment on the permanent staff.

ASSISTANT ELECTRICAL ENGINEER. A.P.T. Grade 5. Salary: £570 to £620 per annum.

Candidates should be corporate members of the Institution of Electrical Engineers, possessing adequate technical knowledge and practical experience in the design of installations, including preparation of plans and specifications and the supervision of contracts in connection with electric lighting, heating and power plants in municipal buildings, including schools and institutions.

The appointment is subject to (*a*) the National Conditions of Service for Local Government Administrative, etc., Officers; (*b*) the Local Government Superannuation Act, 1937; (*c*) the passing of a medical examination, and (*d*) one calendar month's written notice on either side to expire at the end of a calendar month.

Applications, giving age, qualifications and particulars of present and previous appointments and accompanied by copies of three recent testimonials, to be sent to the undersigned, by not later than February 15, 1952.

W. E. BUFTON,
Clerk of the County Council.

County Offices, Ruthin.
January, 1952. (P 787)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointment:—

Area Board Headquarters, Chief Engineer's Department

SECOND ASSISTANT ENGINEER (System Design)
(Vacancy No. 142/51)

Applicants should have wide experience in the electricity supply industry and particular experience in the design and development of distribution systems up to and including 66 kV and the preparation of technical reports and digests of data.

An Honours Degree in Electrical Engineering and Corporate Membership of the Institution of Electrical Engineers, are desirable.

Salary: N.J.B. Agreement Schedule C, AX-DX 2, £809 to £945 per annum, rising to £1,028.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, within fourteen days of the appearance of this advertisement.

(R 28)

COMBUSTION ENGINEERS

COURTAULDS LIMITED require Assistant Combustion Engineers for their Engineering Headquarters, Coventry. Sound knowledge of combustion technology essential, also previous experience in the operation and testing of both watertube and Lancashire boilers and in dealing with problems in the firing of solid, liquid and or gaseous fuels. Candidates should be prepared to travel to various factories in the U.K.—Please write for a detailed form of application (quoting the reference number B.6), to the:— **Personnel Department, COURTAULDS LIMITED, 16 St. Martin's-le-Grand, London E.C.1.** (R 16p)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable appointments:—

ASSISTANT BOILER HOUSE SUPERINTENDENT, Acton Lane Generating Station.

Candidates should have good technical qualifications and a wide experience of boiler house operation and maintenance is essential. The duties will include the supervision of the coaling plant operation.

Salary in accordance with N.J.B. Schedule, Class "H," Grade 7, £784 7s. p.a., inclusive of London Allowance.

STATION SHIFT CONTROL ENGINEER, Stepney Generating Station.

Candidates should have had a good general education and technical training with experience in the operation and control of E.H.T. switchgear.

Salary in accordance with N.J.B. Schedule, Class "F," Grade 10, £584 17s. p.a., inclusive of London Allowance.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the publication of this advertisement.

H. V. PUGH,
Divisional Controller.
(R 26)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for ASSISTANT MAINTENANCE ENGINEER (electrical), Vacancy No. 235, at Earley Generating Station, Reading. Candidates should have had good experience of the maintenance of switch and control gear, motors, transformers, alternators, exciters, etc. Manufacturing experience of power station electrical equipment will be an advantage.

Salary: N.J.B., Class "G," Grade 9 (£621-£648).

There is a probability of housing accommodation becoming available at an early date for the successful applicant.

BOILER HOUSE SHIFT CHARGE ENGINEER, Vacancy No. 286, at Portsmouth Generating Station. Candidates should have had a sound mechanical training and be experienced in all branches of engineering associated with the design and operation of h.p. boiler plant.

Salary: N.J.B., Class "G," Grade 9 (£621-£648).

For both appointments, preference will be given to those holding qualifications leading to corporate membership of a recognised professional institution.

Application forms are obtainable from P. D. A. Oliver, Divisional Secretary, 111 High Street, Portsmouth and should be returned not later than February 22, 1952.

(R 43)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified persons for the following position:—

11/52. SHIFT CHARGE ENGINEER, Loughborough.

Applicants should have sound technical training and be experienced in the operation and maintenance of steam power station plant. The possession of an Ordinary National Certificate in Engineering, or its equivalent, will be an advantage.

The salary for the above appointment will be in accordance with Grade 7, Class "B" of the N.J.B. Agreement, commencing at £539 p.a., and the position will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than February 18, 1952.

L. F. JEFFREY,
Divisional Controller.

February 1, 1952. (R 25)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT SECTION ENGINEER, St. Helens District. Salary, £587 to £609 p.a. (N.J.B. F 9).

Applicants should preferably have the technical qualifications to enable them to become Chartered Electrical Engineers and have had experience in the h.v. and m.v. overhead and underground distribution work. The successful applicant will be required to undertake standby duties.

The appointment is superannuable and subject to medical examination.

Application forms from the Manager, No. 2 Sub-Area, Ref. 27A, MANWEB, Electricity House, Sandiway, nr. Northwich, Cheshire. Closing date, February 18, 1952.

JAMES RANKIN,
Secretary.
(R 21)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

CROYDON "B" Power Station. JUNIOR ENGINEER (Control) experience required in the operation of E.H.T. switchgear and the parallel running of alternators. Class "J." Grades 18/14 commencing at £400 p.a. 1st AND 2nd ASSISTANT CHEMISTS, B.Sc. or A.R.I.C., required. Experience in fuel testing, water analysis and lubricating oil testing essential. Class "J" Grades 9, £733 19s., or 11, £649 19s. p.a. N.J.B. conditions of service.

Apply by March 7, 1952, on forms obtainable from B.E.A., S.E. Division, Lower Ham Road, Kingston-on-Thames. (P 27)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified persons for the following position:—

8/52 JUNIOR ENGINEER, Telecommunications Section, Regional Technical Group.

Applicants should have qualifications to H.N.C. standard, together with experience in automatic telephone type circuits and V.F. signalling as employed in remote and supervisory control systems, P.A.X., etc. Experience of power line carrier technique will be an added advantage.

The selected candidate will be required to live in the Coventry or Leicester districts.

The salary for the above appointment will be in accordance with Grade 9, AX/DX, of the N.J.B. Agreement, commencing at £375 per annum and the position will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, and should be returned not later than February 18, 1952.

L. F. JEFFREY,
Divisional Controller.

January 25, 1952. (P 812)

APPLICATIONS are invited by a large electrical engineering firm in the Midlands to fill TWO AREA SUPERINTENDENT POSTS in the export sales organisation. Applicants should have had a good general education and possess technical qualifications of A.M.I.E.E. together with full studentship or apprenticeship in electrical engineering and have good all-round technical knowledge of turbine, transformer, switchgear and electrical machines. Commercial experience should include at least three years overseas experience, preferably on sales, though applicants with operating or supervisory experience, otherwise suitably qualified, will be considered. A good knowledge of export work is essential. Duties involve the complete supervision of the company's export business, one appointment to cover the Eastern hemisphere, the other to cover Africa and Europe. The ability to meet and entertain visitors and to discuss technical and commercial matters is essential. The posts will be based at the Company's Head Office attached to the works but there may be occasional opportunities for overseas travel. Age range 35 to 45. Salary up to four figures with excellent conditions of service.—Please apply in confidence with full details to Box No. 1453, Electrical Times. (R 31)

BRITISH ELECTRICITY AUTHORITY, Merseyside and North Wales Division, require GENERAL ASSISTANT ENGINEER in Transmission Department. Headquarters, Liverpool. Commencing salary £481. Superannuable, N.J.B. Service conditions. Will be required to supervise the civil engineering works in sub-stations. Higher National Certificate and experience on site works with reinforced concrete structures desirable.—Forms of application from Divisional Secretary, Clarke Gardens, Woolton, Liverpool. Closing date, February 23, 1952. (R 30)

ELECTRICAL DRAUGHTSMAN with some knowledge of motor starting resistance design preferred, but not essential. Age between 22 and 30 years.—Write, stating experience and salary required to E. A. and J. Y. Walsh Ltd., Barton Road Works, Worsley, Manchester. (P 750)

ARMATURE WINDERS WANTED

LONDON DISTRICT. Good men can earn easily, with bonus, £10 per week or more. Club and canteen.—Box No. 1445, Electrical Times. (R 10p)

SIMPLEX ELECTRIC COMPANY LTD.

OLDBURY, BIRMINGHAM

WORKS MANAGER

APPLICATIONS are invited for the appointment of Works Manager of the Broadwell factory, Oldbury, producing low tension switchgear, conduit fittings, etc. Applicants must have up-to-date knowledge of machine shop and tool room methods, general works and personnel management, production planning and material control. Knowledge of foundry work an advantage. Appointment carries a salary commensurate with responsibilities, and a pension scheme is in force.—Applicants, between the age of 35 and 45, should forward full details of experience and qualifications to the Secretary. (R 6p)

ASSISTANT RATE-FIXER required for industrial switchgear. Applicants should have experience in this work particularly for machine shop and be capable of estimating times from blue prints.—Applications in writing, giving particulars of age, training, experience and salary expected to Employment and Welfare Manager, Johnson and Phillips, Ltd., Victoria Works, London, S.E.7. (P 708)

BRITISH ELECTRICITY AUTHORITY require DRAUGHTSMEN with experience of one of the following: Reinforced concrete design and detail; layout of outdoor sub-stations; electrical diagrams; charts, statistics and general electrical work. Salary, N.J.B. Grade 6, Schedule "D," £438 to £574 (contributary superannuation).—Forms from D. Moffat, Director of Establishments, British Electricity House, 170 Great Portland Street, London W.1, to be returned by February 22. Quote reference AE.191. (R 14)

CABLE JOINTERS used to working on 3·3 kV cables. E.T.U. membership necessary.—Reply to Electrical Engineer, George Wimpey and Co. Ltd., New Kent Refinery, Isle of Grain, nr. Rochester, Kent. (R 11)

CHIEF DRAUGHTSMAN, and SENIOR DEVELOPMENT DESIGNERS are required for automatic machine tool work and special purpose equipment development. Candidates should have extensive experience of original designing, energy and initiative. Professional qualifications are considered an advantage. Salaries in the range £600-£950 per annum are payable to suitable men. Every assistance will be given in securing accommodation.—Apply Secretary, Box No. 1451, Electrical Times. (R 29)

CONTRACT AND TENDERING ENGINEERS required for switchgear department. Men aged 21 to 30, with experience of l.t. and h.t. switchgear up to 11 kV are invited to apply. Knowledge of 33 kV gear would be an advantage. First-class conditions with non-contributory pension scheme. Possible housing assistance.—Please apply, giving full details of training, experience, age, etc., to the Chief Personnel Officer (E.D.), The Brush Electrical Engineering Co., Ltd., Loughborough, Leicestershire. (P 730)

DRAUGHTSMAN having works training and experience with power transformers up to 44 kV and 3,000 kVA. Ordinary National Certificate preferred. Working conditions admirable. Salary according to age and experience.—Box No. 1443, Electrical Times. (R 9)

DRAUGHTSMEN. Engineering Consultants have vacancies for Mechanical Engineering Draughtsmen, experienced in power station design and layout, pipework layout, circulating water systems or coal and ash handling plants, but draughtsmen with good experience on other work might be considered. Positions are permanent with good prospects, and are pensionable. Free lunches are provided and a five-day week is in operation. —Applicants should write, stating age, experience and salary required, to the Secretary, Ewbank & Partners Ltd., 10/11 Grosvenor Place, London S.W.1. (P 826)

DRAWING AND TRACING, LTD., have vacancies for experienced SENIOR DRAUGHTSMEN and JUNIOR DETAIL DRAUGHTSMEN in their production drawing office, specialising in radio, electrical and mechanical engineering. 5-day week. Pension scheme. Good working conditions. Salary range £390-£533.—Write, stating age and experience, 456 Ewell Road, Surbiton, Surrey. (P 421)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

FOR INDIA

AN old-established and well-known company in India representing several reputable English manufacturers requires an *Electrical Sales Engineer* normally for employment in Bombay or Calcutta or Madras. Age preferred, 22 to 28. Applicant must hold degree in Electrical Engineering or equivalent from a U.K. University, and have had two years' practical experience with an approved U.K. manufacturer. Preference given to man having training and experience with switchgear manufacture and estimating. Three years' agreement and six months' leave (with pay) from India if offered second agreement after termination. Initial kit allowance, £75. First-class passages. Monthly salary for single man, 1,100 rupees first year, 1,200 rupees second year, 1,300 rupees third year, plus local monthly allowance 250 rupees. Additional allowance if married. Mutual contributory Provident Fund. Application must give full details of education, qualification, training and experience, and will be treated confidentially.—Box No. 1459, Electrical Times. (R 47p)

ELECTRICAL ENGINEER required with some knowledge of switchgear or resistance manufacture. Applicants should be between the ages of 22 and 30 years. —Write, in first instance, stating experience and salary required, to E. A. and J. Y. Walsh Ltd., Barton Road Works, Worsley, Manchester. (P 749)

ELECTRICAL FOREMEN. The Steel Company of Wales Ltd., has vacancies for Electrical Maintenance Foremen at its Abbey Works. Industrial experience is essential, preferably in a large integrated steelworks.—Applications, giving full particulars of qualifications and experience, should be addressed to the Personnel Superintendent, The Steel Company of Wales Ltd., P.O. Box No. 3, Port Talbot. (P 822)

ENGINEERS, aged 25 to 40 years, required for senior and junior positions in test and service department (based on London). Duties involve starting-up, efficiency testing, and service work chiefly on land water-tube boilers up to power station capacities. Experience of this or similar type of work is desirable. Applicants holding M. of T., naval watch-keeping or equivalent certificate preferred. Works apprenticeship essential. Salary from £600 to £750 per annum according to qualifications. Contributory pension scheme.—Apply, in writing, stating age, full particulars of experience and qualifications to Foster Wheeler Limited, 3 Ixworth Place, S.W.3. (P 770)

FERRANTI LIMITED have vacancies for qualified DRAUGHTSMEN in the Transformer Department for: (a) design of distribution transformers up to 100 kVA. Previous transformer experience desirable but not essential. (Ref. TDO(D)). (b) Design and layout of plant. (Ref. TDO(P)). Permanent staff appointments with pension benefits.—Forms of application from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote appropriate reference. (P 748)

GRADUATE ELECTRICAL and/or MECHANICAL ENGINEERS required by large firm in the Midlands engaged in heavy electrical and mechanical engineering. Two or three openings for training in Production Engineering and Works Management. Age range 25 to 30 years. Good salary, prospects and facilities for advanced technical education. Excellent conditions.—Please apply in confidence to Box No. 1441, Electrical Times. (R 8)

INFORMATION OFFICER. To assist in technical library and information service for research, engineering and commercial personnel of a large electrical engineering firm in the N.W. Technical qualifications in engineering or physics essential. Knowledge of French or German and some experience in library classification added qualifications. Salary will depend on qualifications and experience, and will be progressive.—Reply, giving particulars of training and experience, marking envelopes "Information Officer" to Box No. 1415, Electrical Times. (P 774)

JUNIOR METER TESTER required, experience in single phase meter testing essential, pholyphase meter experience an advantage. Progressive post for young man anxious to improve. Permanent position, good working conditions, canteen, medical and dental facilities. Non-contributory life insurance and pension schemes, eligibility according to rules. Hostel accommodation available.—Apply, quoting 1 2 1, Personnel Superintendent, English Electric Co., Ltd., Stafford. (R 32)

LEADING MANUFACTURER of high voltage apparatus in South East Lancashire requires YOUNG ELECTRICAL ENGINEER for research and investigations on insulation. Candidates should be of H.N.C. or Degree standard.—Applications, marked "I," should give full particulars of experience, qualifications and age to Box No. 1439, Electrical Times. (R 7)

MANAGER required for Aircraft Accessories Division of an established Organisation. Candidates must have had recognised training as engineers; detailed knowledge and experience of all types of aircraft control (electric, hydraulic and pneumatic) and of generators, motors, pumps, control systems, etc., associated therewith and be competent to advise aircraft designers on the selection of this type of equipment. This is a senior post, carrying a substantial salary and, after period of probationary service, participation in pension scheme. Assistance with housing.—Please write giving full details and quoting ref. H.E.F. to Box No. 1457, Electrical Times. (R 46)

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SCIENCE OR ENGINEERING GRADUATE. To train in technical library and information service of large industrial research establishment in the N.W. Knowledge of French or German preferred. Progressive post.—Reply, giving qualifications, age, etc., marking envelopes "Graduate" to Box No. 1417, Electrical Times. (P 775)

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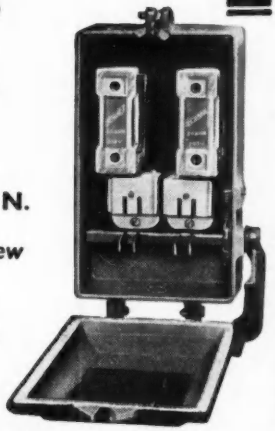

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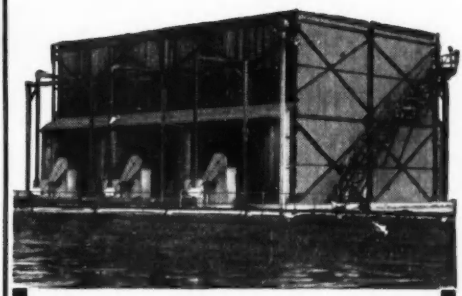

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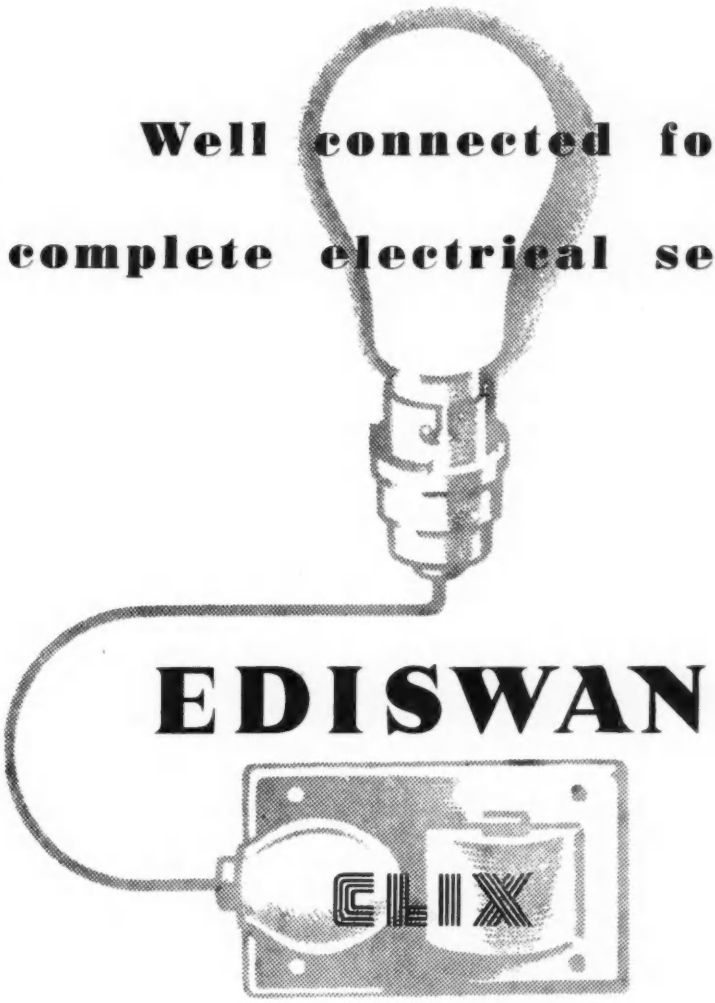

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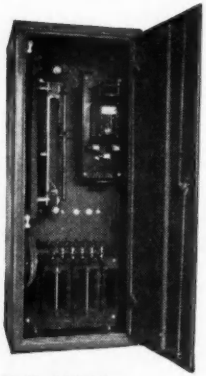

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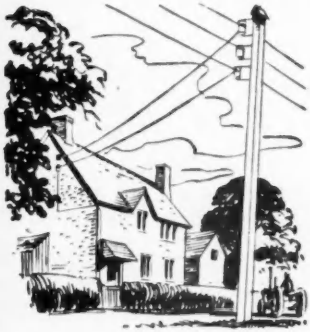

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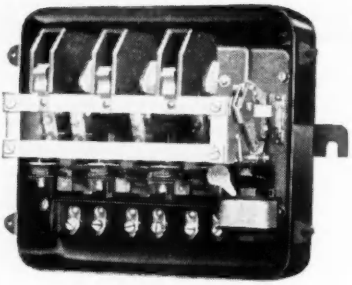

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S.55

By courtesy of E. F. Pressey, Esq., F.R.I.C.S., Engineer and Surveyor, Borough of Wokingham.

Eleco Planned Lighting

makes roads safer at night

One picture can convey as much as a hundred words. Look therefore at this reproduction from an un-retouched photograph of the ELECO installation on the Reading-Ascot Road (A.329) at Wokingham, Berkshire. *Observe, too, how planned lighting enhances the beauty of the countryside at night.*

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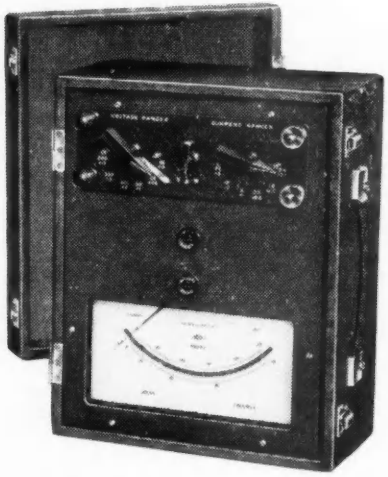

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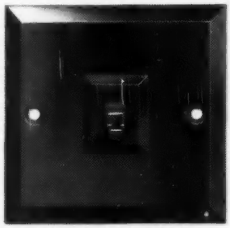

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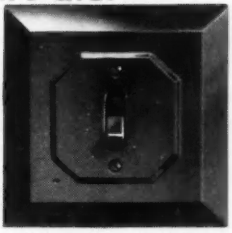

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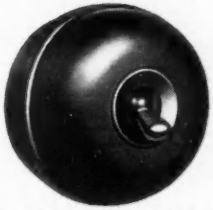

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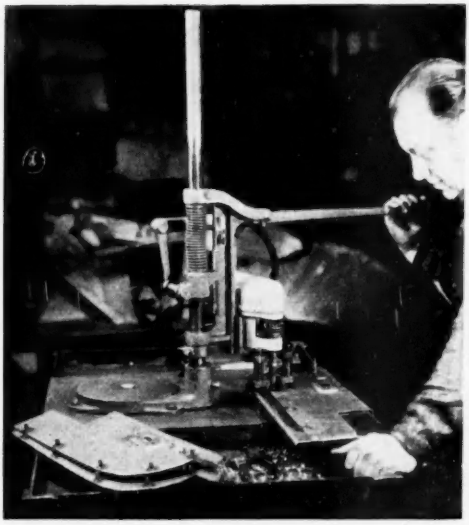

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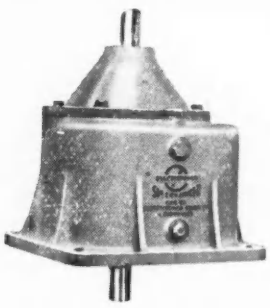

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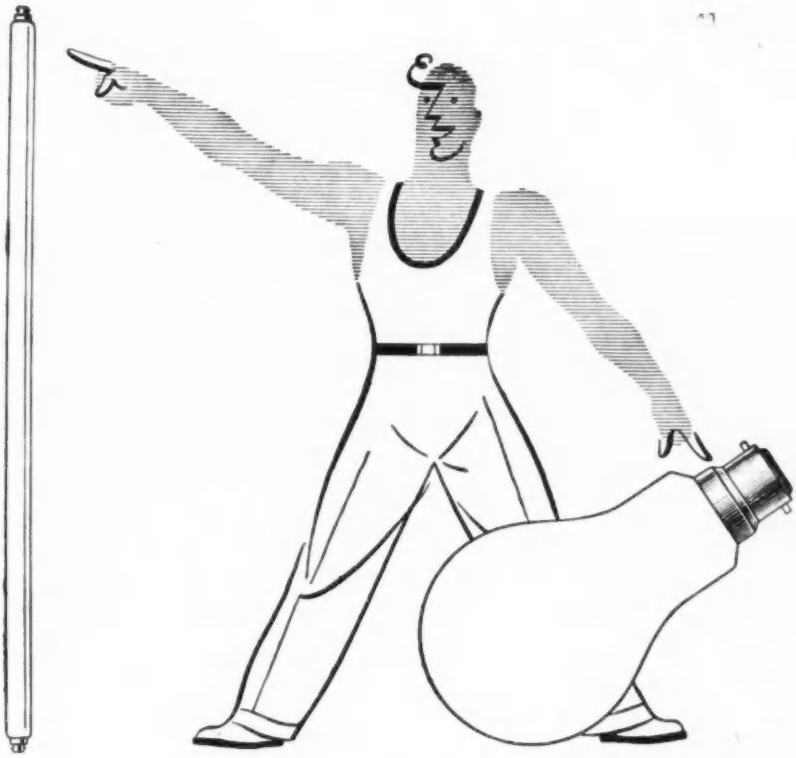

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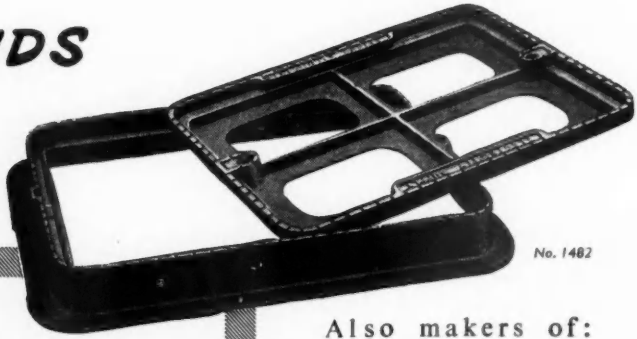

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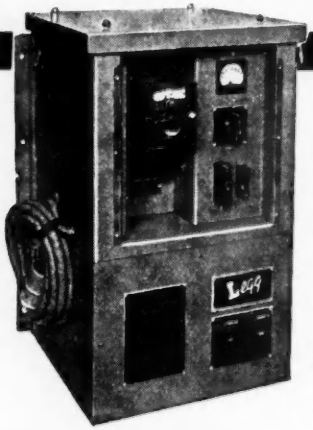

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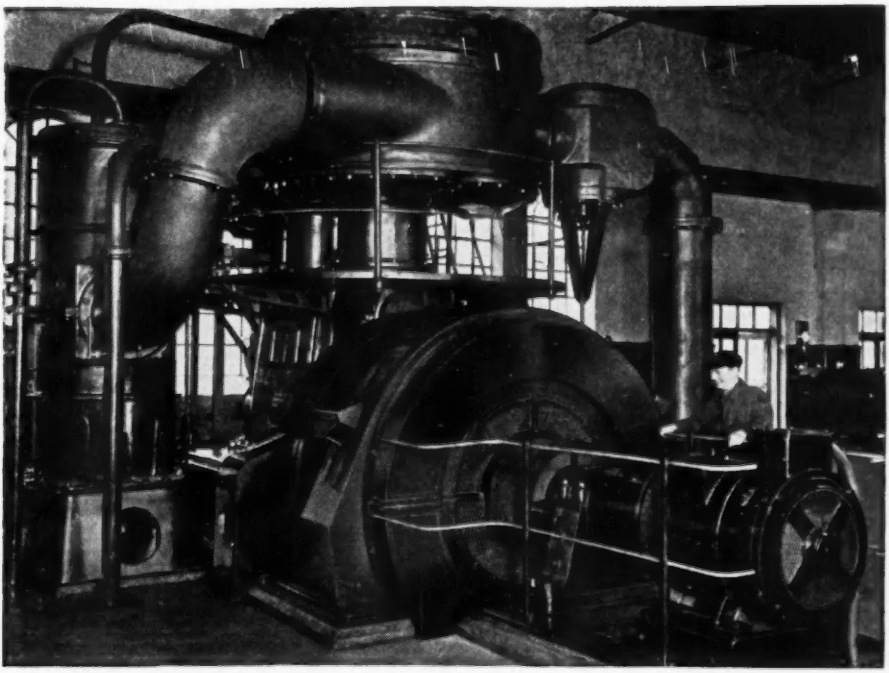

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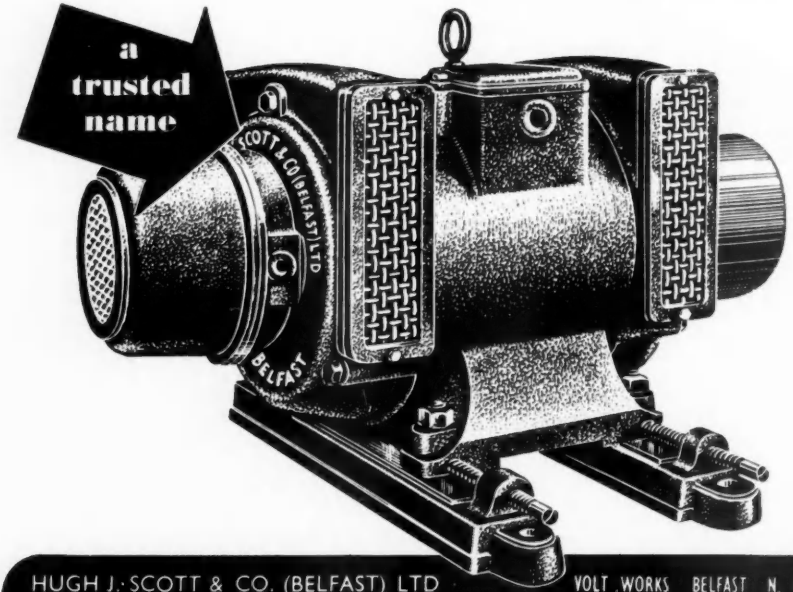

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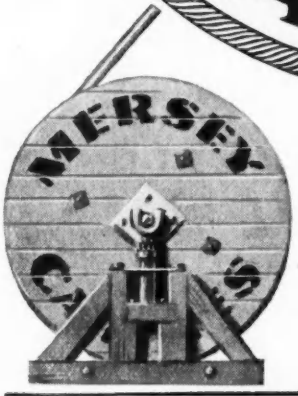

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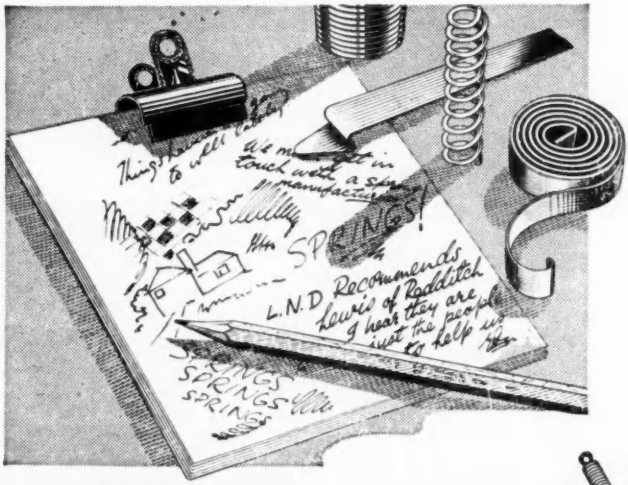

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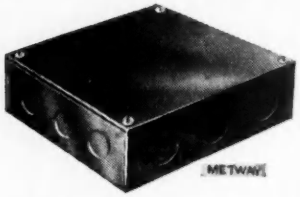

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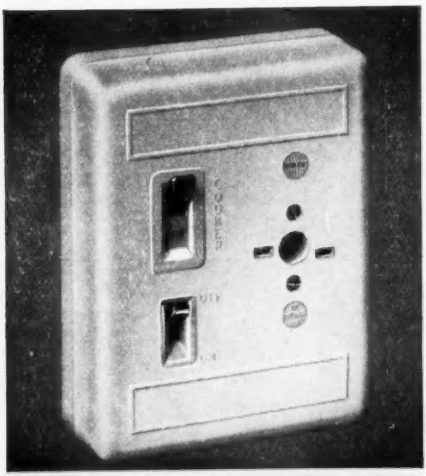

Cat. No. WSU as illustrated, with separate 15-amp Switch for Socket Outlet.

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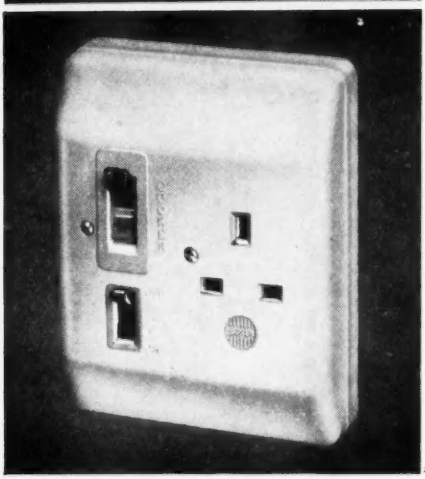

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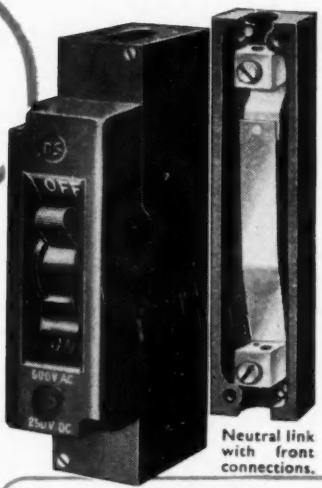

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